AFSWP Report #217

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UNITED STATES NAVY

APPENDIX TO VOLUME II

ANALYSIS OF 500-MILLIBAR PATTERNS

March 1954

PROJECT AROWA

Bureau of Aeronautics Project Arowa (TED-UNL-MA-501)
"Applied Research; Operational Weather Analysis"
(AROWA)

U. S. Naval Air Station
Building R-48
Norfolk, Virginia

April 1954

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AFSWP Report # 717

BUREAU OF AERONAUTICS PROJECT AROWA (TED-UNL-MA-501)
"Applied Research; Operational Weather Analyses"

Appendix to Volume II

ANALYSIS OF 500-MILLIBAR PATTERNS

March 1954

BUREAU OF AERONAUTICS PROJECT AROWA
BUILDING R-48
U. S. NAVAL AIR STATION
NORFOLK 11, VIRGINIA

April 1954

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ARITHMETICAL METHODS

In carrying out this procedure certain methods and short cuts have been developed and used in handling the numbers. These methods are listed here for the information of those using the procedure and as an explanation of the numerical values on the charts.

1. Reading:

Heights are read to the nearest 50 feet from the Andrews' Analysis. This analysis has contours for every 400 feet. This requires that intermediate contours are sketched near singular points and in areas of weak gradient.

17,864 feet read as 785
17,722 feet read as 770
18,026 feet read as 805
18,338 feet read as 835

2. Computation of Space Mean:

Heights at the four points of the diamond grid are summed and rounded to three digits, using heights from 1:

17,864 feet read as 785
17,722 feet read as 770
18,025 feet read as 805
18,338 feet read as 835
3195 sum plotted as 320

Contours are drawn on the mean charts for every 8 numbers from 336. The equivalence of these numbers in standard contours is shown:

336	18,400
328	18,200
320	18,000

On all mean charts the 18,400 contour and the 17,200 contour are emphasized in red. The 18,400 contour has a statistical relation to the maximum wind at that level and with the 17,200 show the major flow channel. The 17,200 contour disappears frequently in mid-summer and this value should be revised upward to 17,600 about 1 June.

3. Total Tendency:

The total tendency is plotted in tens of feet with the last number always 5 or zero. On a total tendency chart:

5 = 50 feet
10 = 100 feet
15 = 150 feet etc.

Isolines are drawn for every 20 units on the chart. Center tendencies are estimated. Falling tendencies 40-60 and 80-100 etc., are shaded in red. Rising tendencies of the same value are shaded in blue. Zero lines are not drawn.

4. Long Wave Tendencies:

The difference between daily mean heights are plotted at each point. These values range from 0 to about 30. Their meaning in actual height change is:

$$2 = \frac{200}{4} = 50 \text{ feet}$$

$$10 = \frac{1000}{4} = 250 \text{ feet}$$

$$20 = \frac{2000}{4} = 500 \text{ feet}$$

These charts are analyzed for isolines named 0 +5, -5 +10, -10 etc. Centers smaller than 5 are essentially no change. That is there is a basic indeterminacy of about 2.5 due to numerical processes.

The area between isolines numbered +5 and +10, and +15 and +20 etc., are shaded in blue. The similar areas with falling tendencies are shaded red.

5. Departure from Normal:

The difference in height between the daily mean height and the height from the space averaged normal is plotted. These values range from 0 to about $\pm$ 80. Their numerical meaning is:

$$4 = \frac{400}{4} = 100 \text{ feet}$$

$$+20 = \frac{2000}{4} = 500 \text{ feet} \quad \text{etc.,}$$

These charts are analyzed for 0, $\pm$10 $\pm$ 20 units etc. The area between 0 and +10 and between +20 and +30 are colored blue and the corresponding fall areas in red.

6. Continuity Charts:

The continuity chart is prepared by reading heights along a selected latitude circle and plotting these heights on a graph with

time as one coordinate and longitude as the other. The normal heights for the month are read from the space averaged normal chart and this line is plotted in green each day. When the actual line is above the normal line the area involved is shaded blue and when the actual line is below the normal line the area is shaded in red.

A vertical line marking the longitude of a location of particular interest is helpful for orientation. Norfolk is indicated in this fashion on the continuity charts presented here.

HEMISPHERIC THREE DAY AVERAGE ZONAL WIND

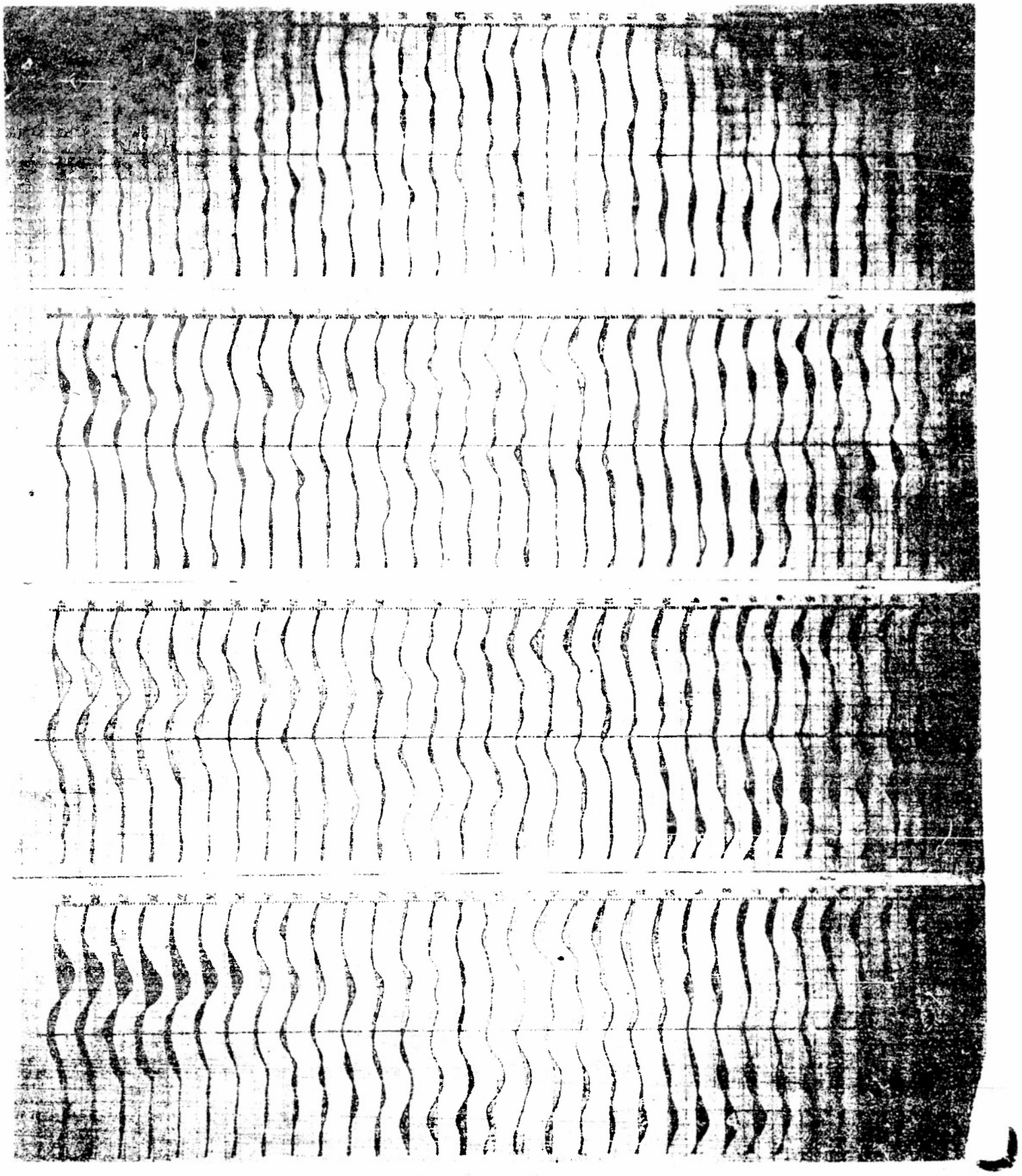
(meters per second
departure from normal)

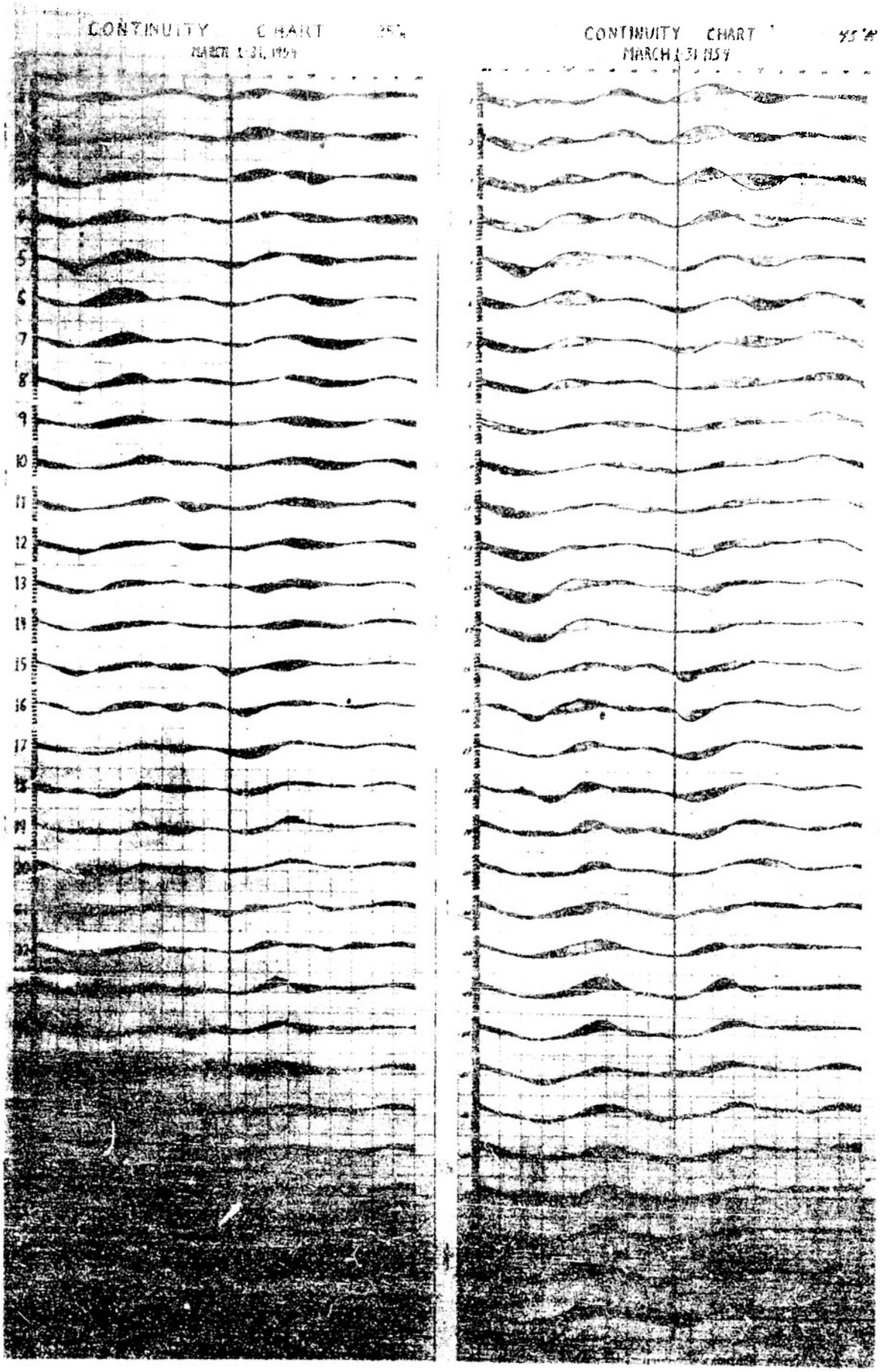
YEAR 1954
MONTH MARCH

LAT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
67.5		8.2	8.2	8.1	7.8	7.3	6.8	6.9	7.2	8.0	8.4	9.0	9.4	9.6	9.5	9.3	9.4	9.6	10.0	10.5	10.9	10.7	10.4	9.9	9.1	8.4	7.6	7.0	6.3	5.9	
62.5		8.9	9.2	9.7	9.8	9.1	8.1	7.4	7.3	7.5	7.9	8.6	9.1	9.5	9.9	10.1	9.6	9.0	9.3	10.5	11.3	11.6	11.4	10.9	10.3	9.0	7.6	6.5	5.4	4.7	
57.5		9.2	8.9	9.3	9.9	10.7	10.4	9.7	8.4	7.6	7.8	8.4	9.0	9.2	9.9	9.9	9.6	9.1	9.3	10.2	10.8	11.0	10.9	10.7	10.1	9.1	8.6	8.4	8.0	7.3	
52.5		10.2	10.7	11.5	11.7	12.8	12.9	12.7	11.2	10.0	9.3	8.7	8.5	8.8	9.5	10.0	10.1	10.6	10.6	10.6	10.5	10.8	11.1	10.8	10.0	10.6	9.8	10.5	11.6	12.5	
47.5		13.7	13.3	13.2	13.0	13.7	14.6	14.3	14.1	12.9	12.1	11.5	11.2	11.2	10.9	11.4	12.2	12.2	12.0	10.9	11.0	11.9	12.0	11.6	12.3	13.4	14.2	14.7	15.1	16.2	
42.5		14.9	17.0	16.5	16.2	15.4	15.9	16.3	16.9	16.9	16.0	15.0	14.7	15.0	15.2	15.4	15.1	14.3	14.2	13.8	14.1	13.7	14.2	15.0	16.0	17.3	17.7	17.4	17.1	17.5	
37.5		16.2	16.8	17.5	17.3	16.4	15.6	16.1	17.6	19.3	19.8	19.6	18.7	18.5	18.4	18.4	18.2	18.1	17.7	17.2	16.6	15.9	15.2	14.9	15.3	15.9	16.8	17.9	18.4	17.8	
32.5		16.0	16.7	17.2	17.1	15.9	15.9	16.7	18.1	16.5	20.0	20.3	20.7	20.2	20.1	19.7	19.6	18.7	18.4	17.9	17.9	17.6	17.6	17.3	16.6	15.5	15.1	15.8	16.4	17.0	
27.5		14.9	14.0	15.2	16.2	16.3	15.8	15.6	15.9	16.4	17.1	18.2	18.5	18.7	18.7	19.3	19.5	19.1	17.8	16.6	16.1	15.8	16.3	15.4	15.7	14.5	14.8	14.4	14.8	14.5	
22.5																															
17.5																															
12.5																															

YEAR 1954
MONTH MARCH

LAT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
67.5		MA	MA	MA	MA	A	A	A	A	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	A	A	N	N	N	
62.5		MA	MA	MA	MA	A	A	A	A	A	A	A	A	MA	MA	A	A	A	A	MA	MA	MA	MA	MA	MA	A	N	N	B	B	
57.5		A	N	A	A	A	A	A	N	N	N	N	N	A	A	A	A	N	A	A	A	A	A	A	A	N	N	N	N	B	
52.5		N	N	N	A	A	A	N	N	N	N	B	B	B	N	N	N	N	N	N	N	N	N	N	N	N	N	N	A	A	
47.5		N	N	N	N	N	A	A	N	N	N	B	B	B	B	B	N	N	N	B	B	N	N	N	N	A	A	A	MA	MA	
42.5		N	A	A	A	N	N	A	A	A	A	N	N	N	N	N	N	N	N	B	N	N	N	N	A	MA	MA	MA	MA	MA	
37.5		B	B	N	B	B	MB	B	N	A	A	A	A	A	A	A	A	A	N	N	N	N	B	B	B	N	A	A	MA	A	
32.5		MB	MB	N	MB	MB	MB	MB	B	MB	A	A	A	A	A	A	A	A	N	N	N	N	N	N	N	MA	A	MA	MA	MA	
27.5		MB	MB	MB	B	B	B	B	B	B	N	A	A	A	A	MA	MA	MA	N	N	N	N	N	N	N	MA	MA	MA	MA	MA	
22.5																															
17.5																															
12.5																															

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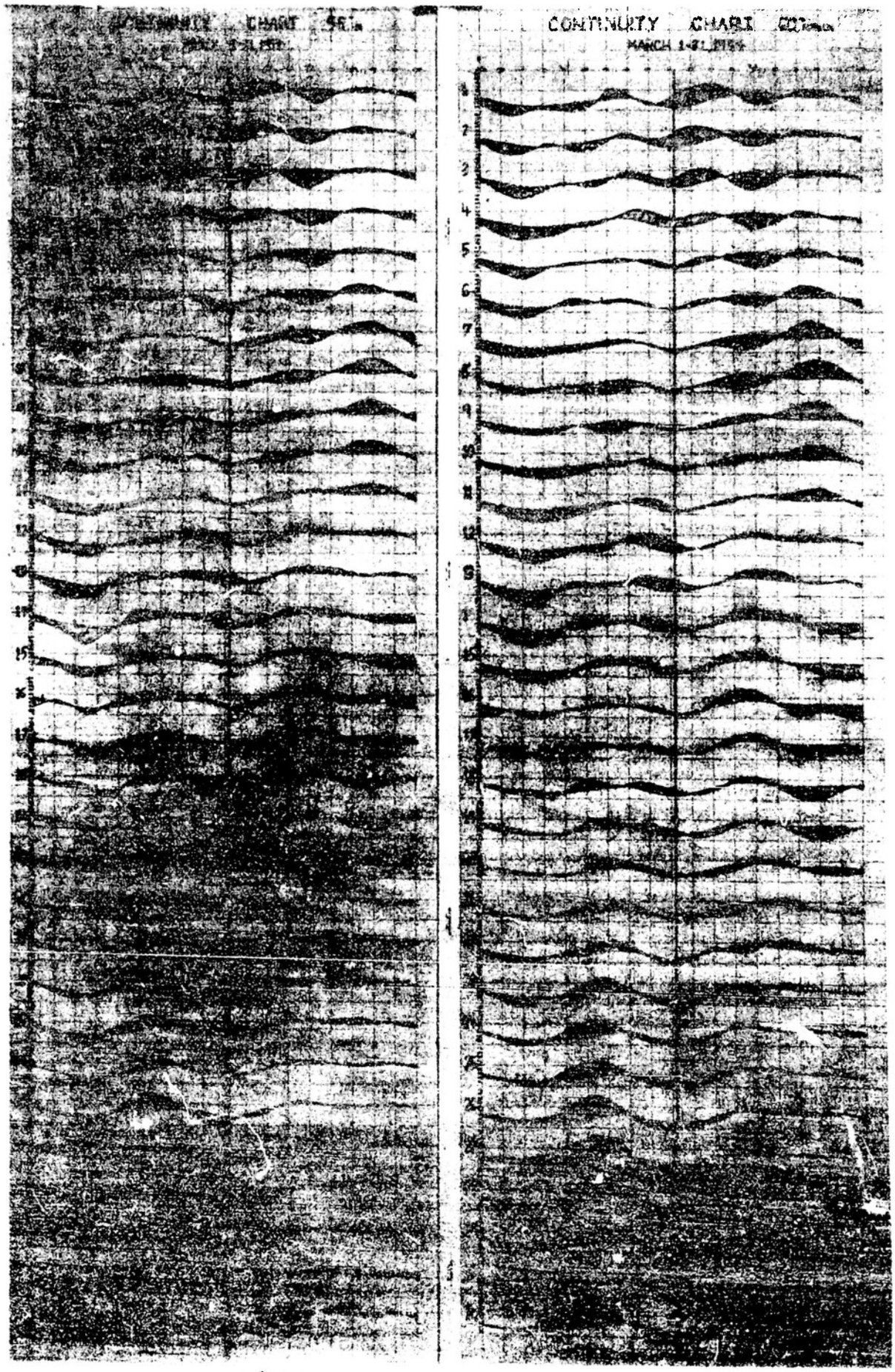
MARCH 31, 1959
CONTINUITY CHART
MARCH 31 1959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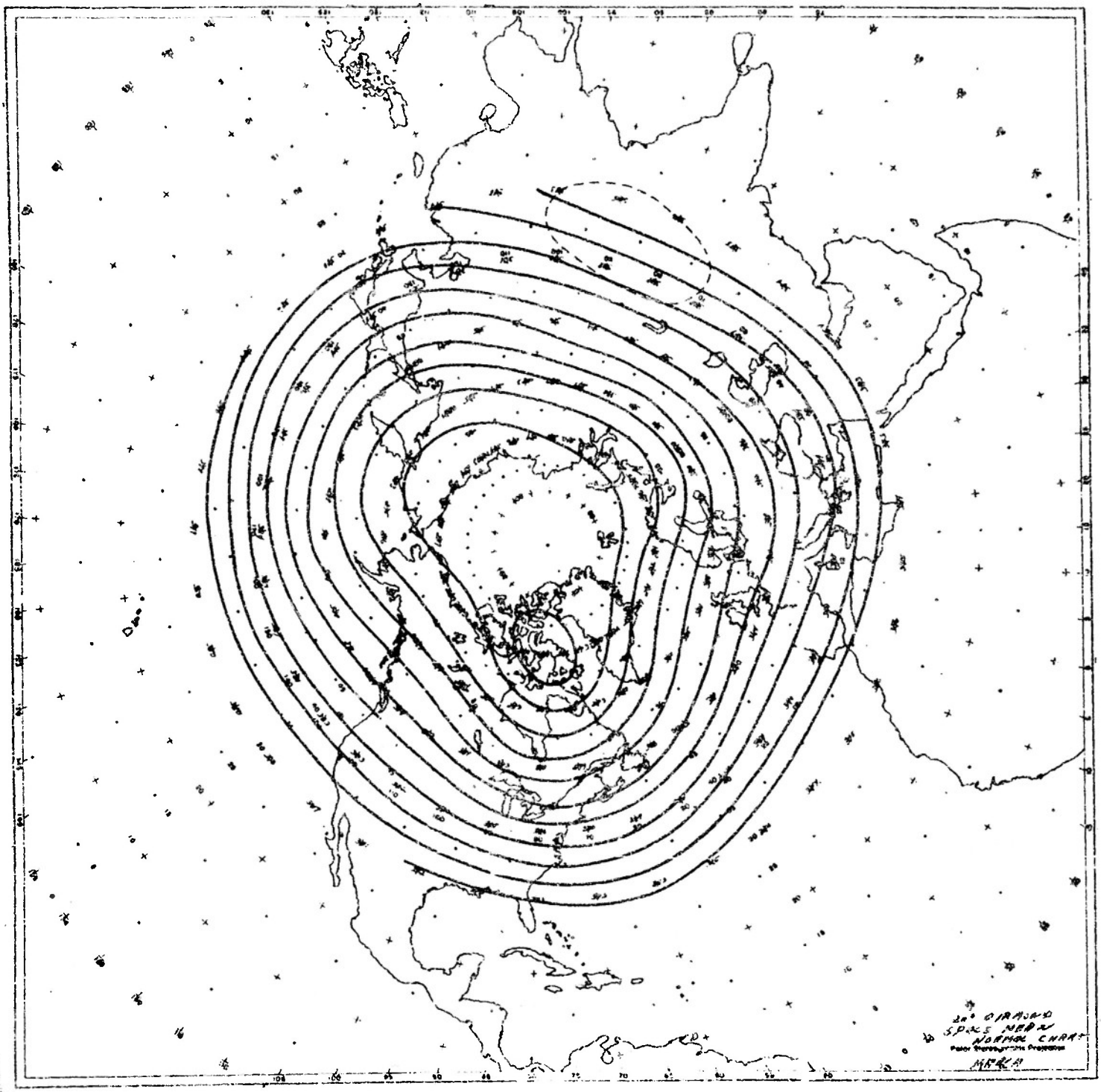
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NORMAL CHART
Polar Stereographic Projection
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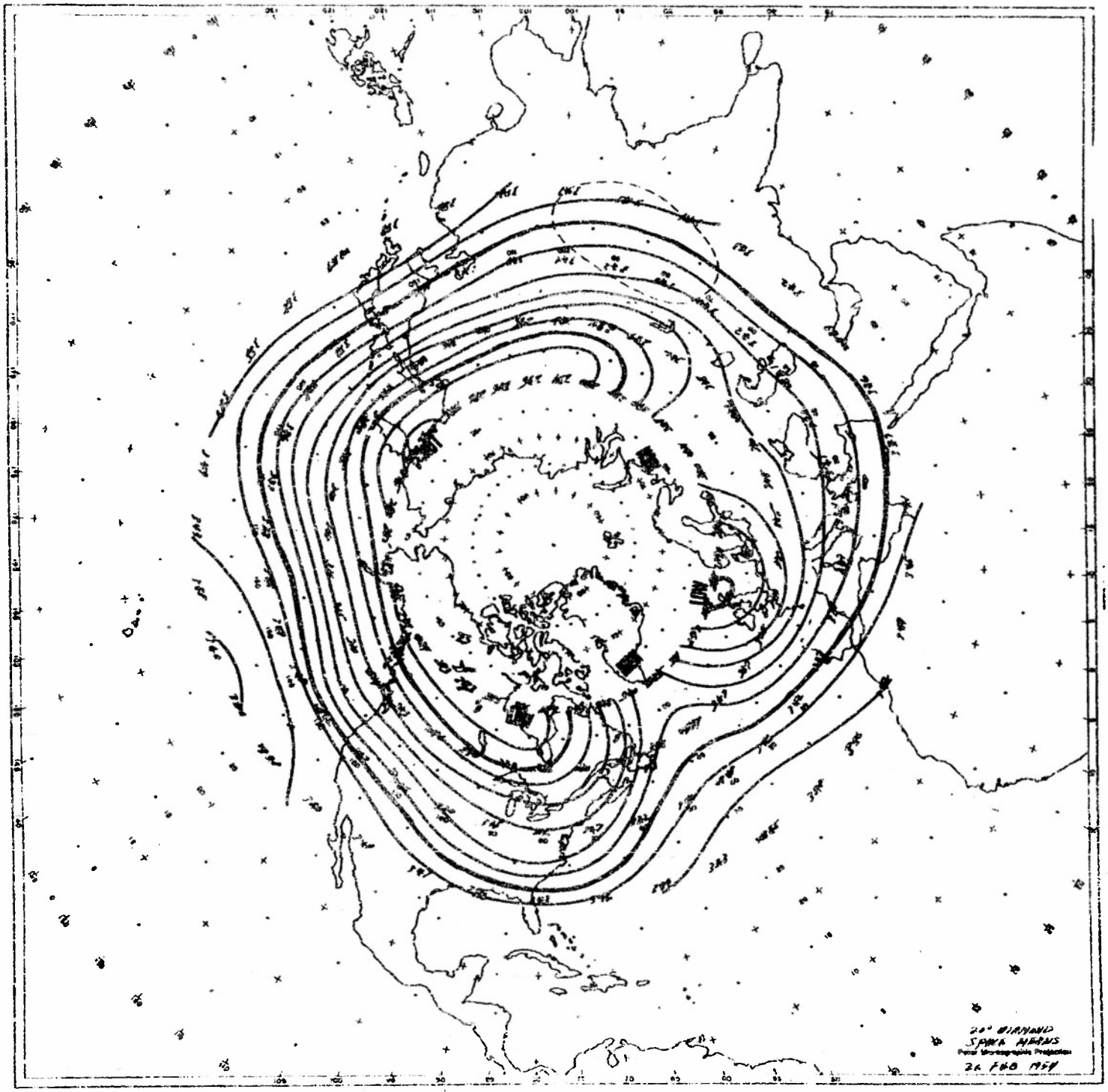
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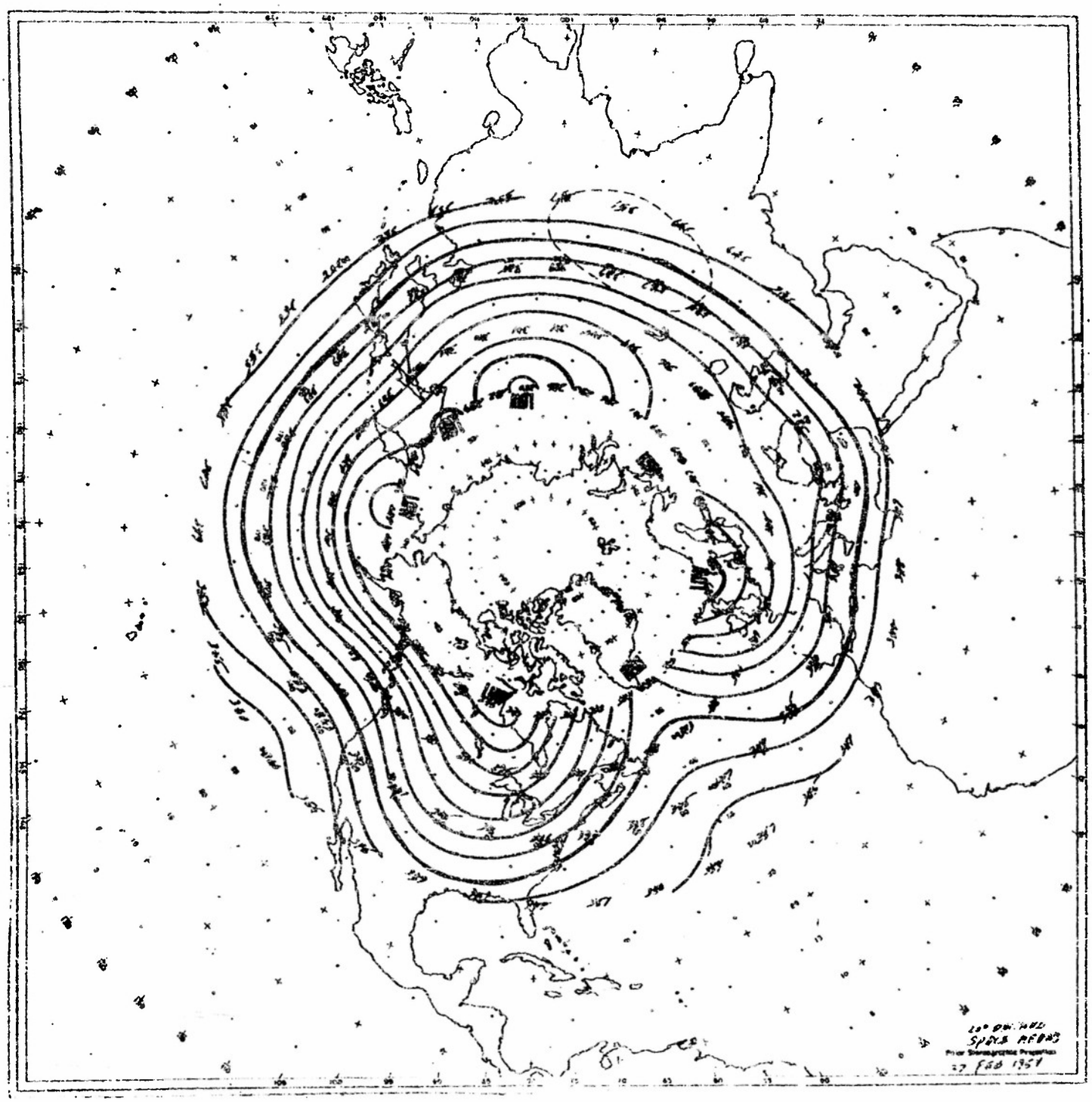
SPACE MEANS
Polar Stereographic Projection
26 FEB 1954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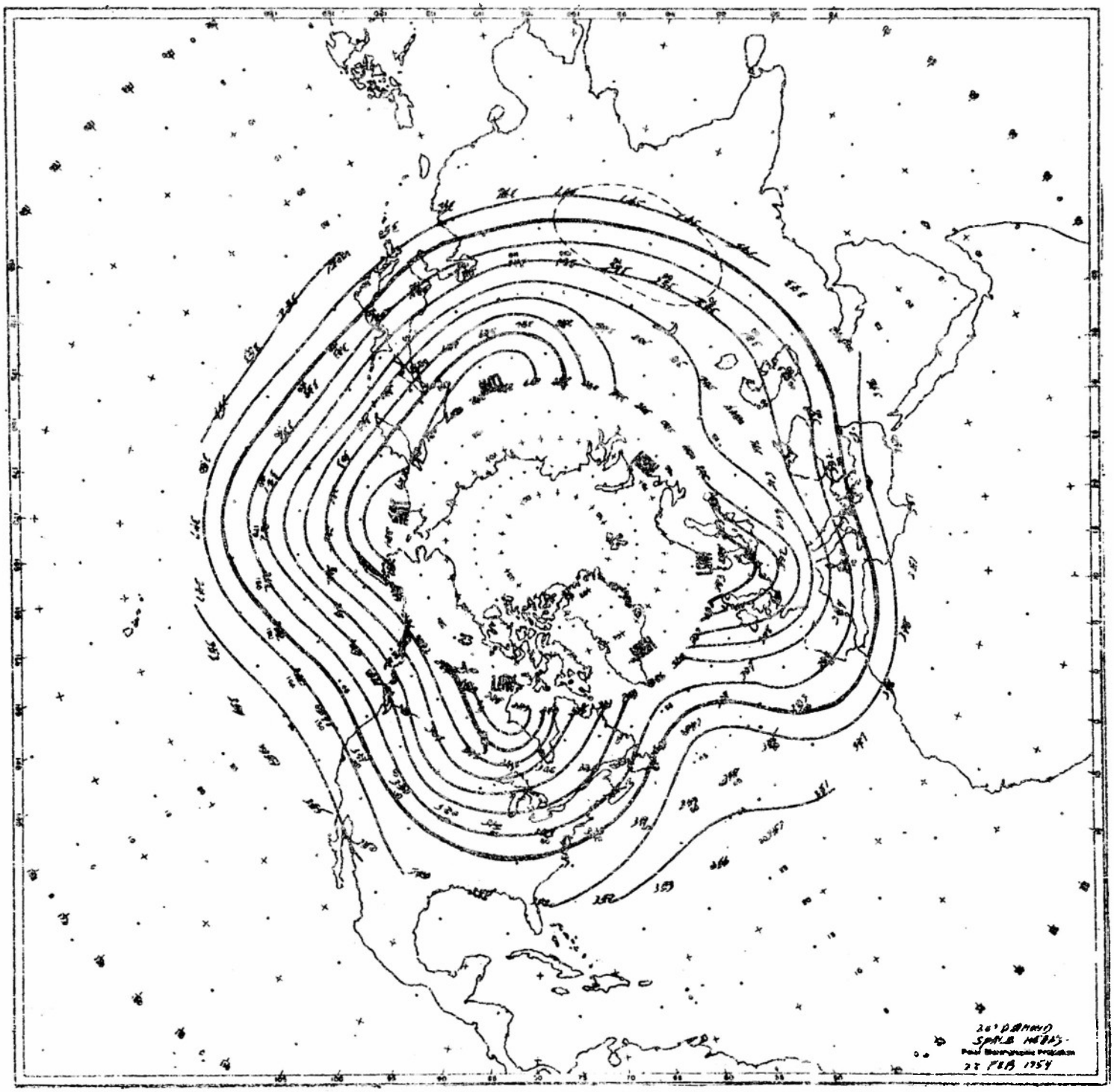
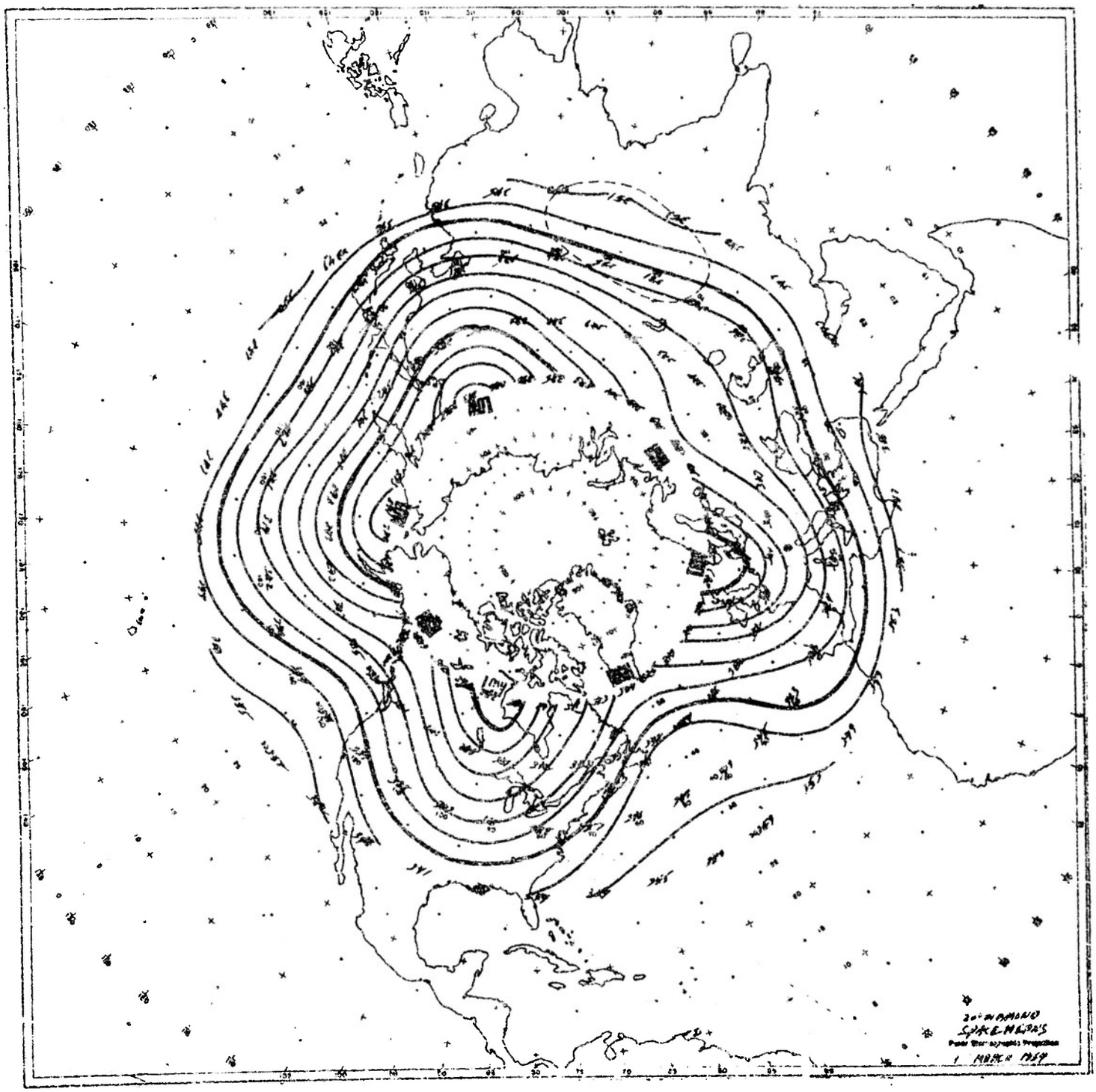
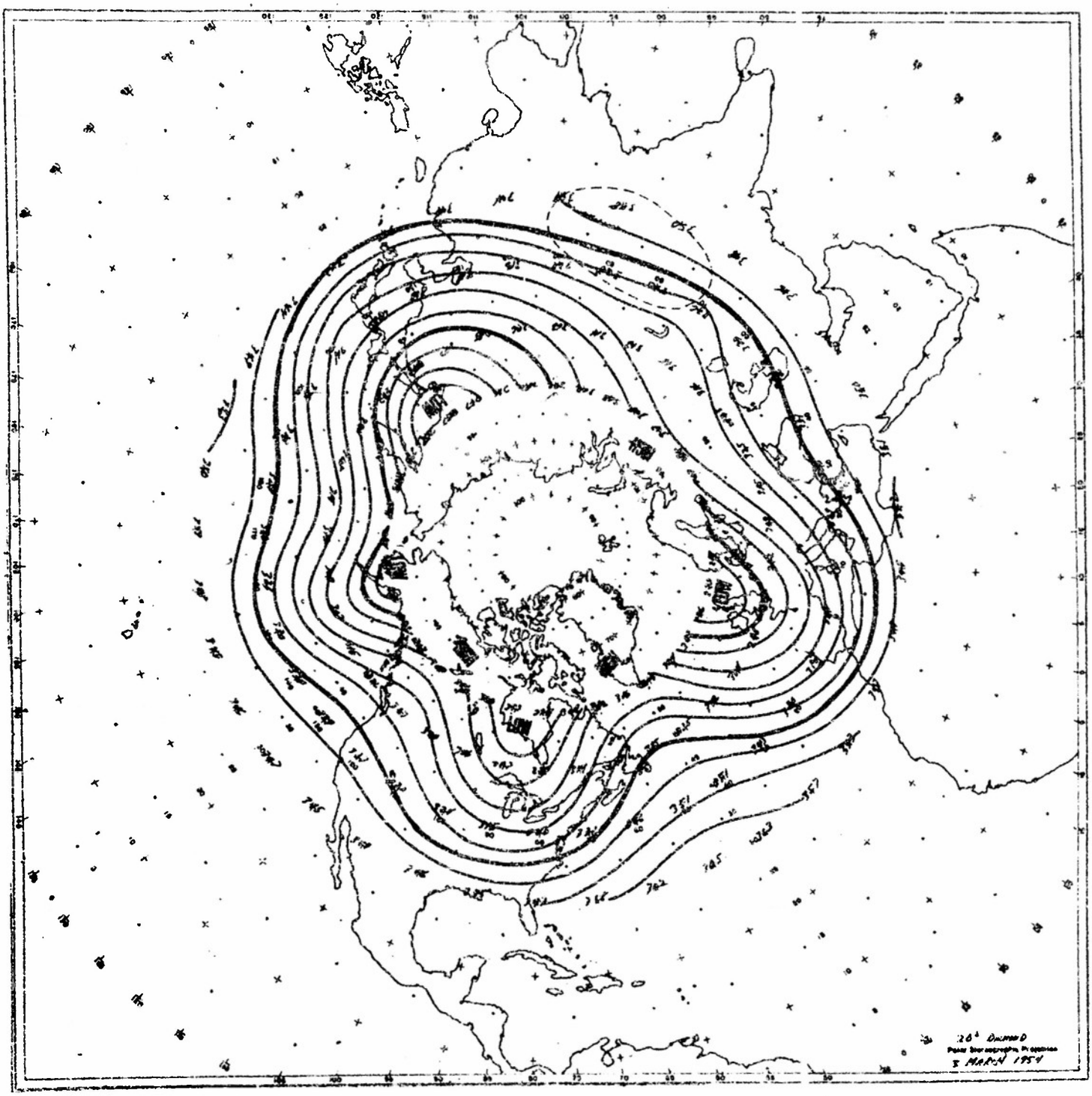
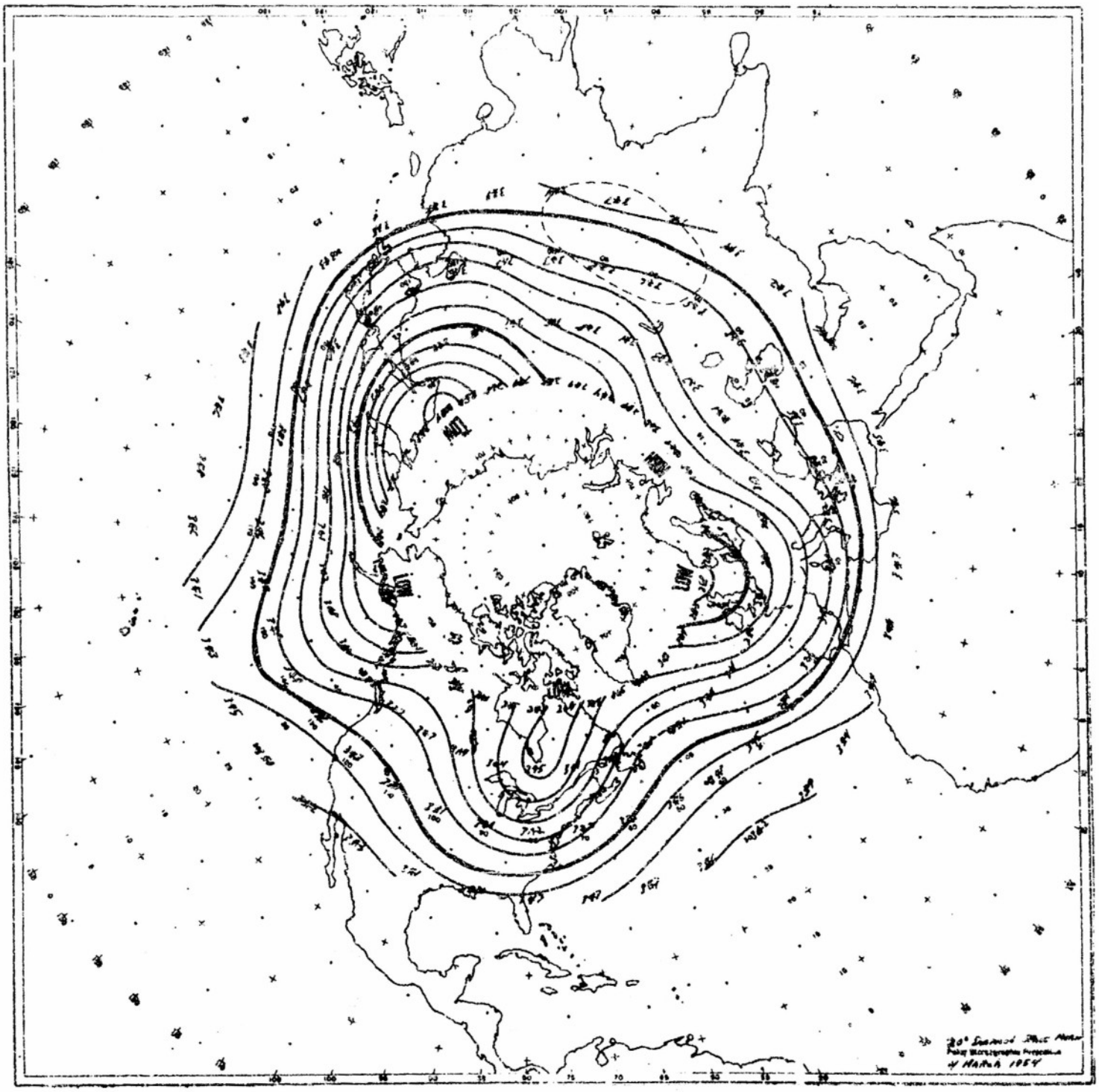
27 FEB 1957


SPALB HEADS
Polar Stereographic Projection
FEB 1954


SPACE MEANS
Polar Stereographic Projection
1 MARCH 1959


20° DIAMOND
Polar Stereographic Projection
3 MARCH 1954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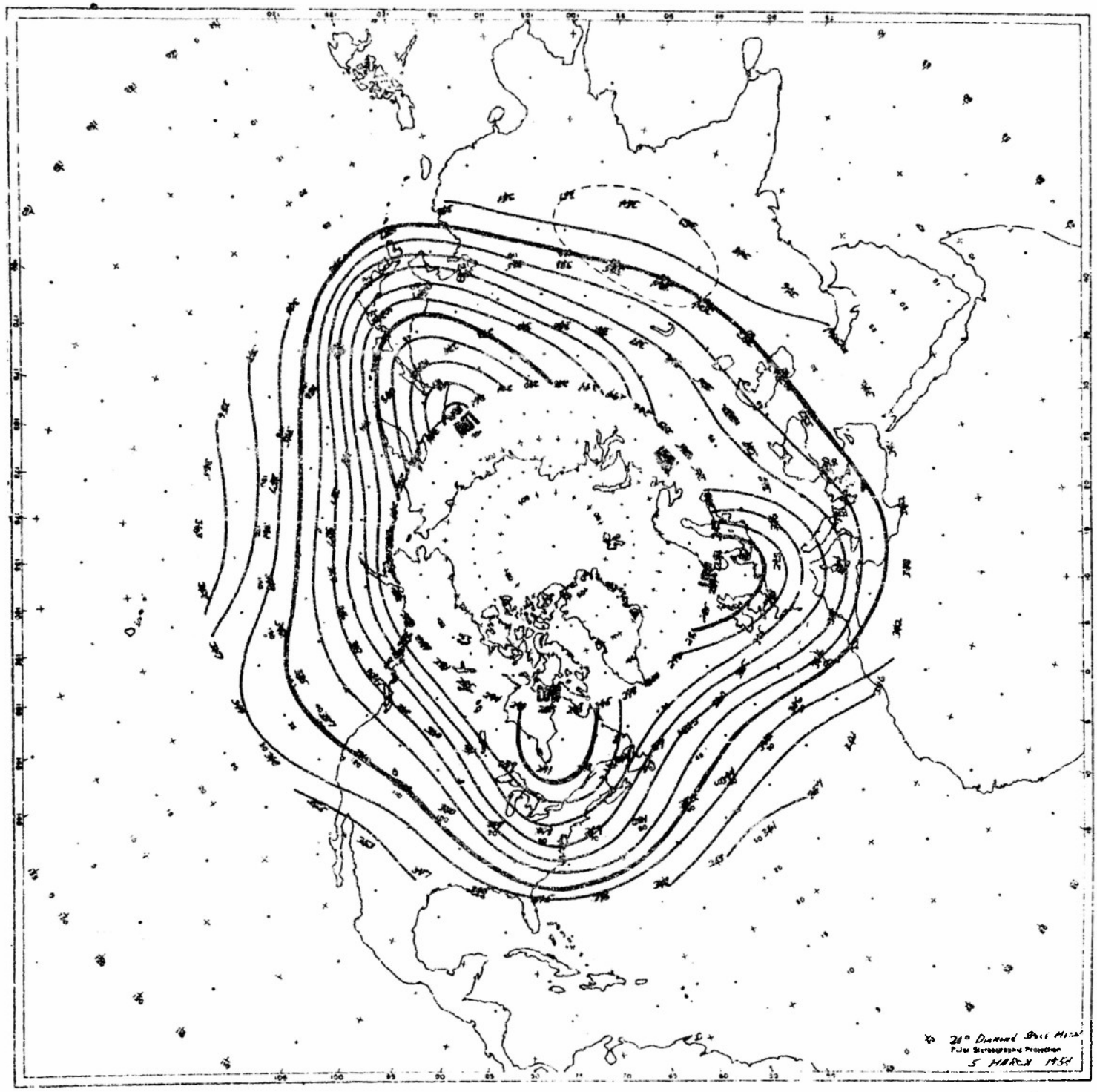
LOW
LOW


28° Diamond Dust Mean
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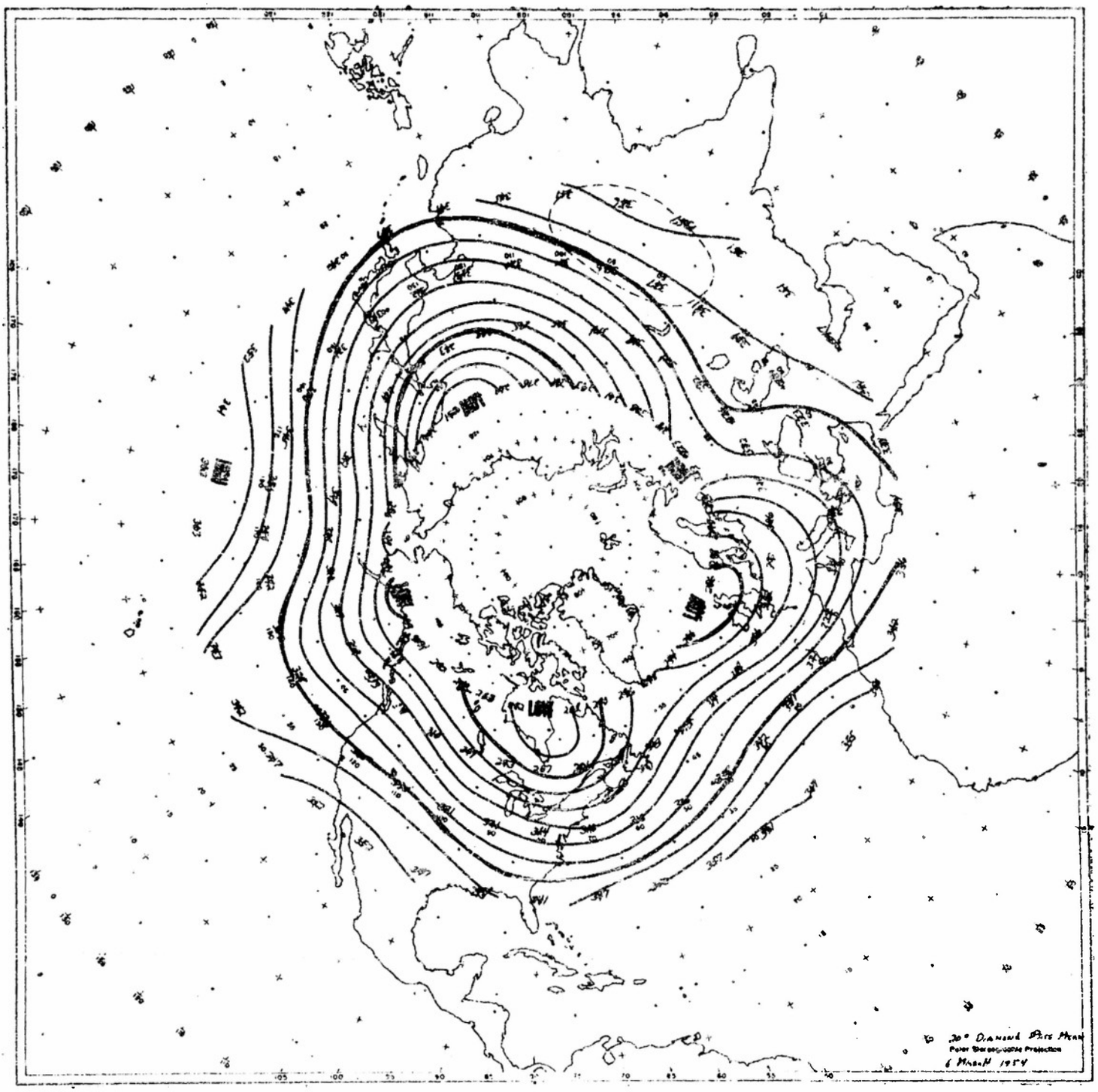
5 MARCH 1954


30° Diamond Pole Mean
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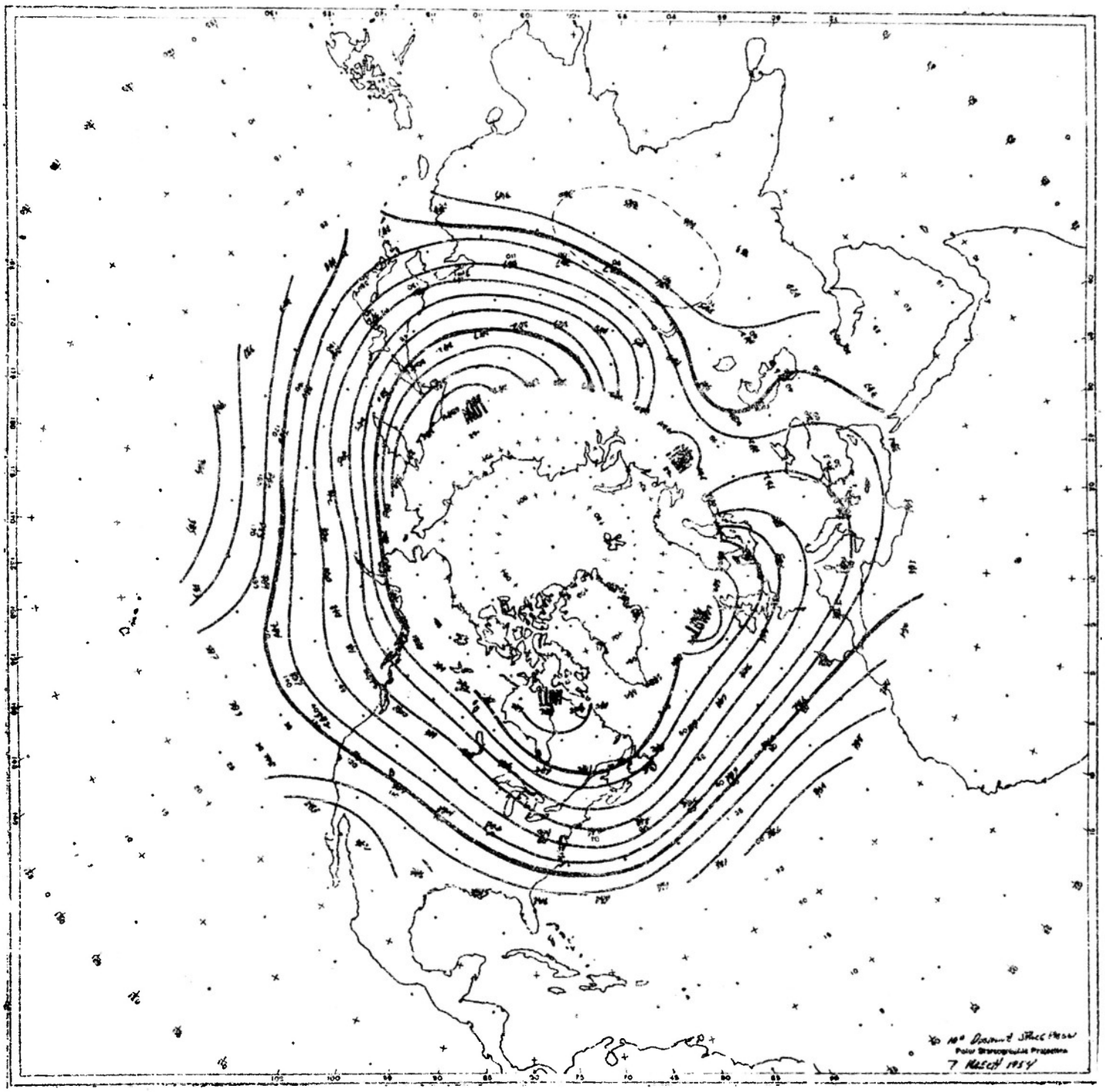
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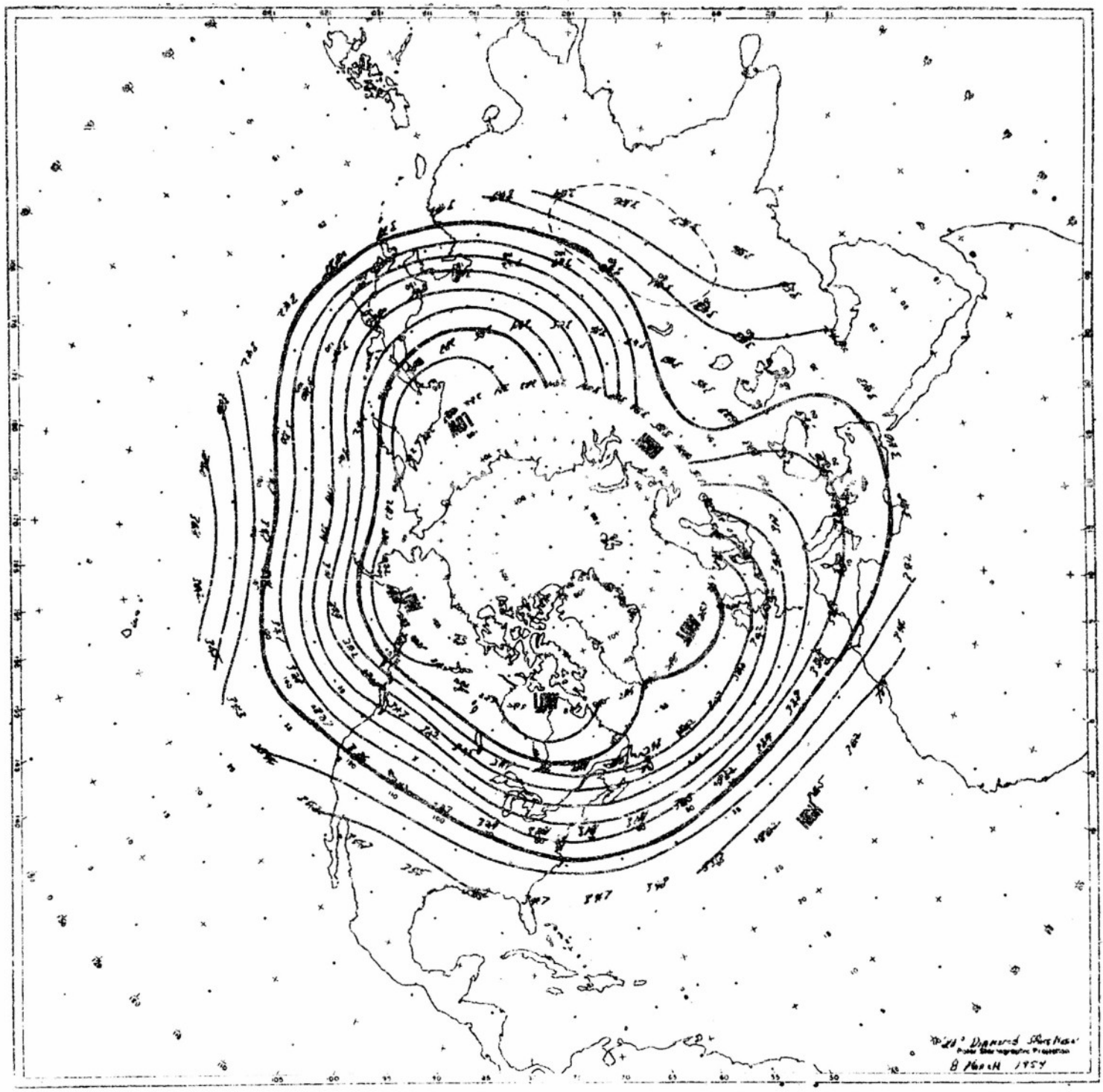
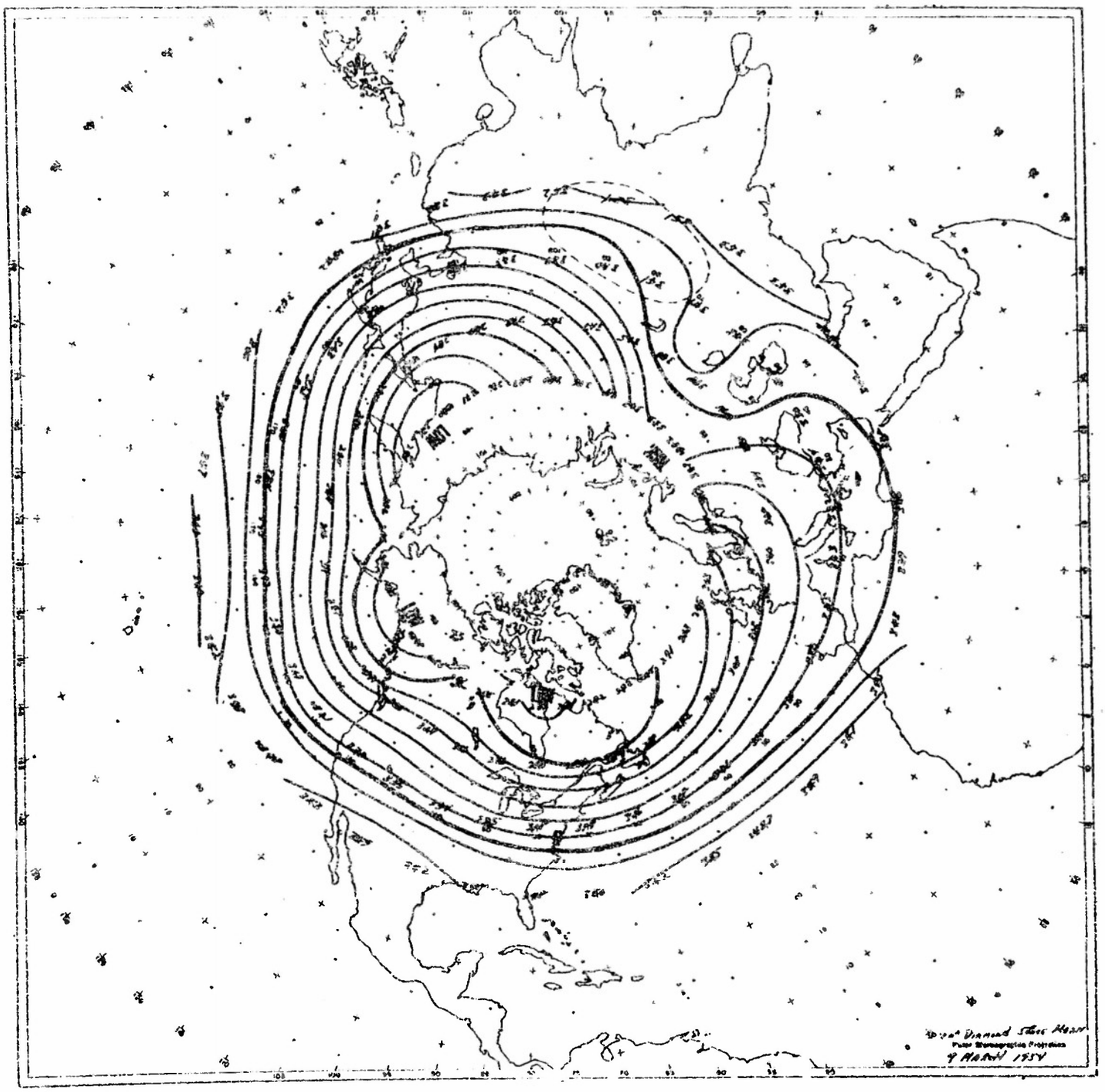
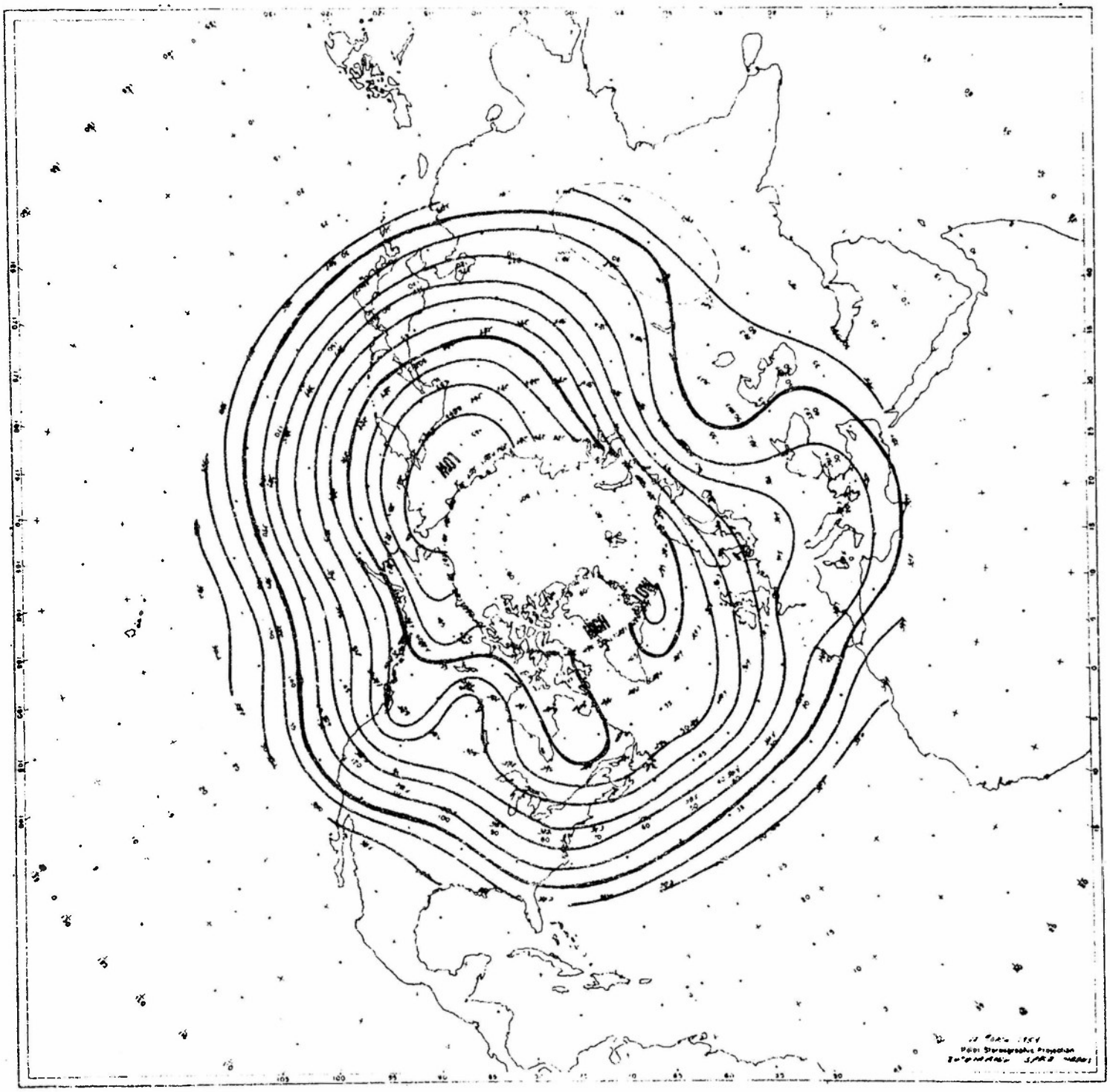



Diamond Stage Mean
Polar Stereographic Projection
9 March 1954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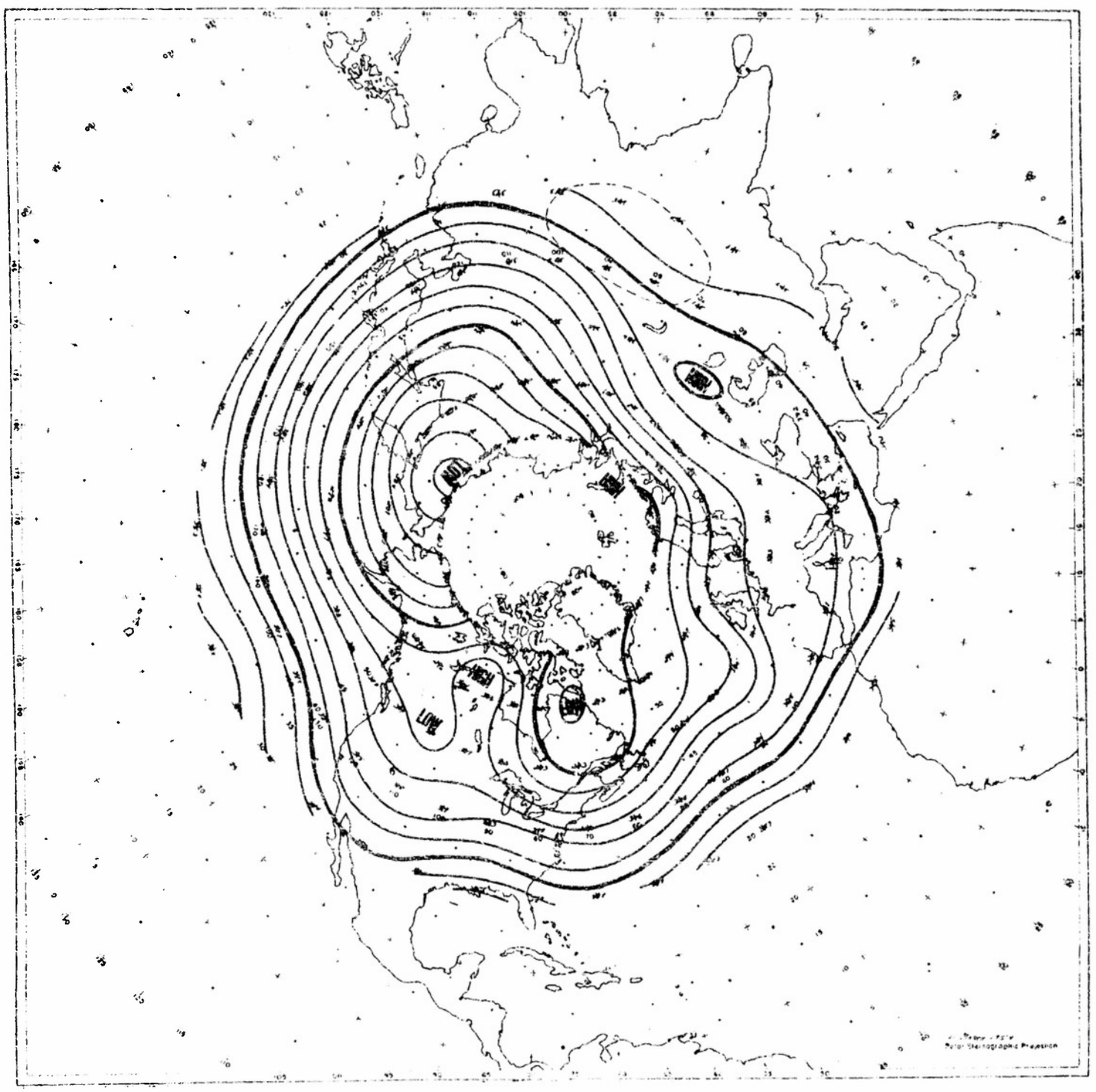
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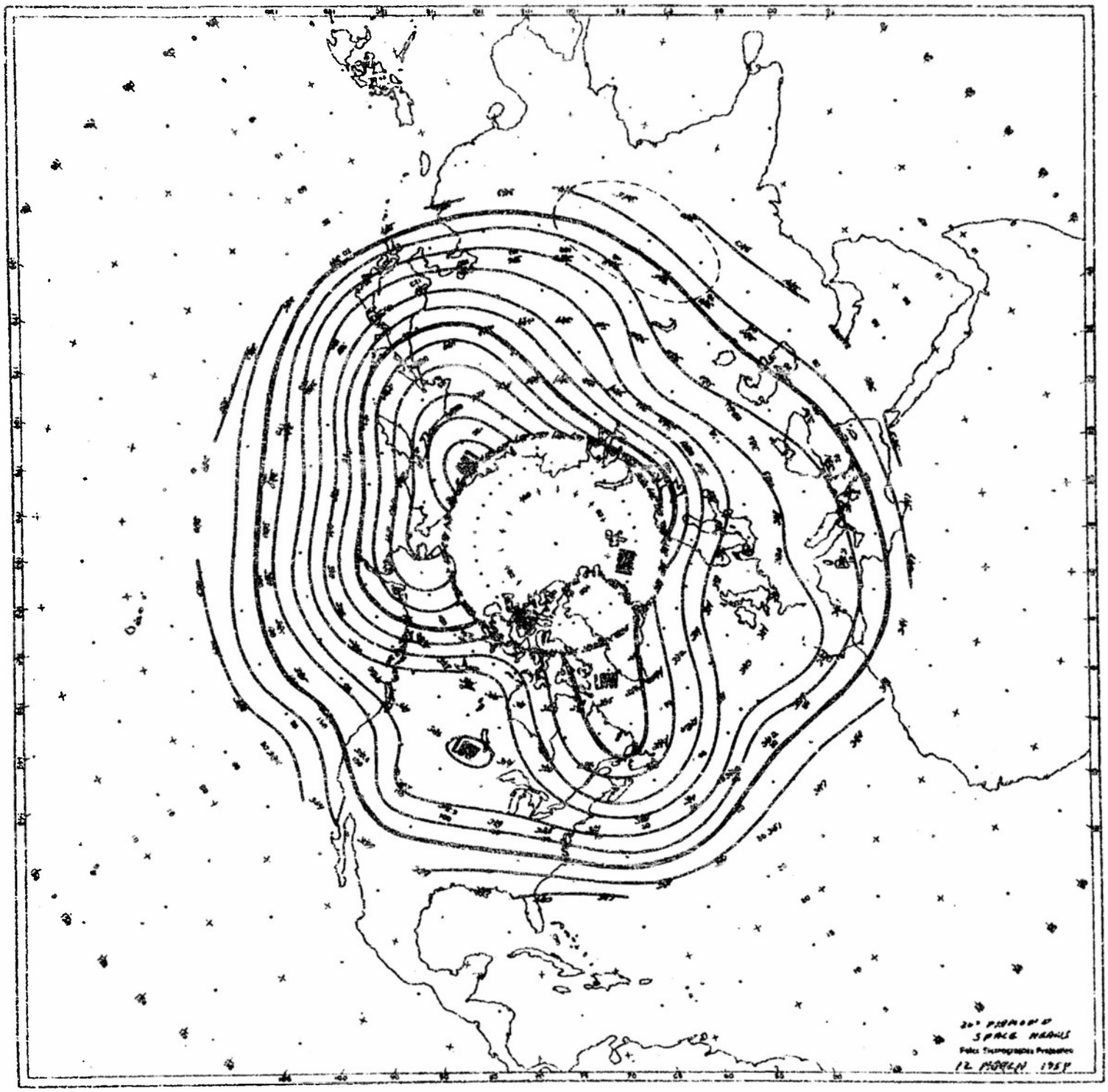
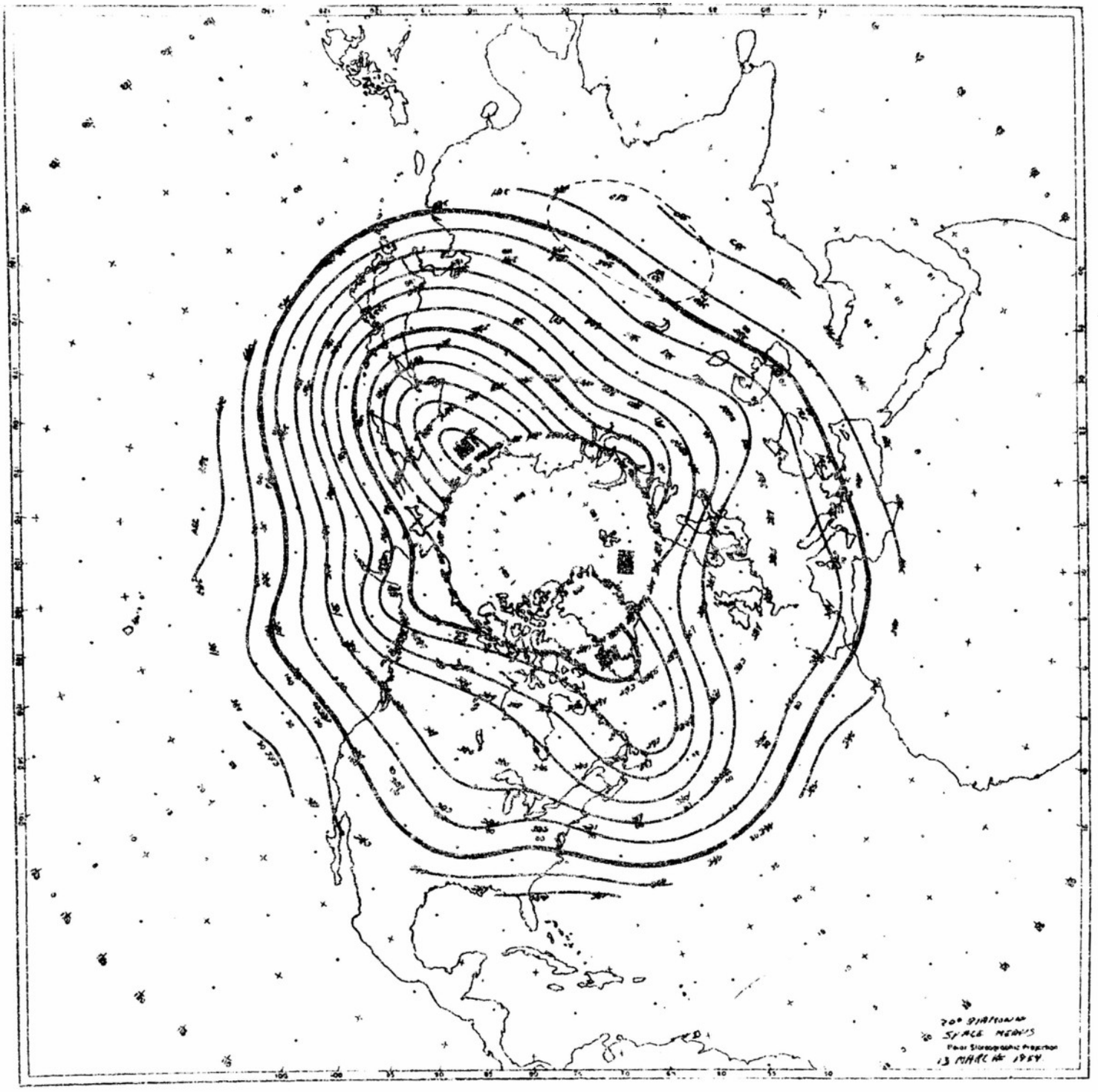
HIGH
HIGH
LOW
HIGH


SPACE HEAVIS
Polar Stereographic Projection
12 MARCH 1959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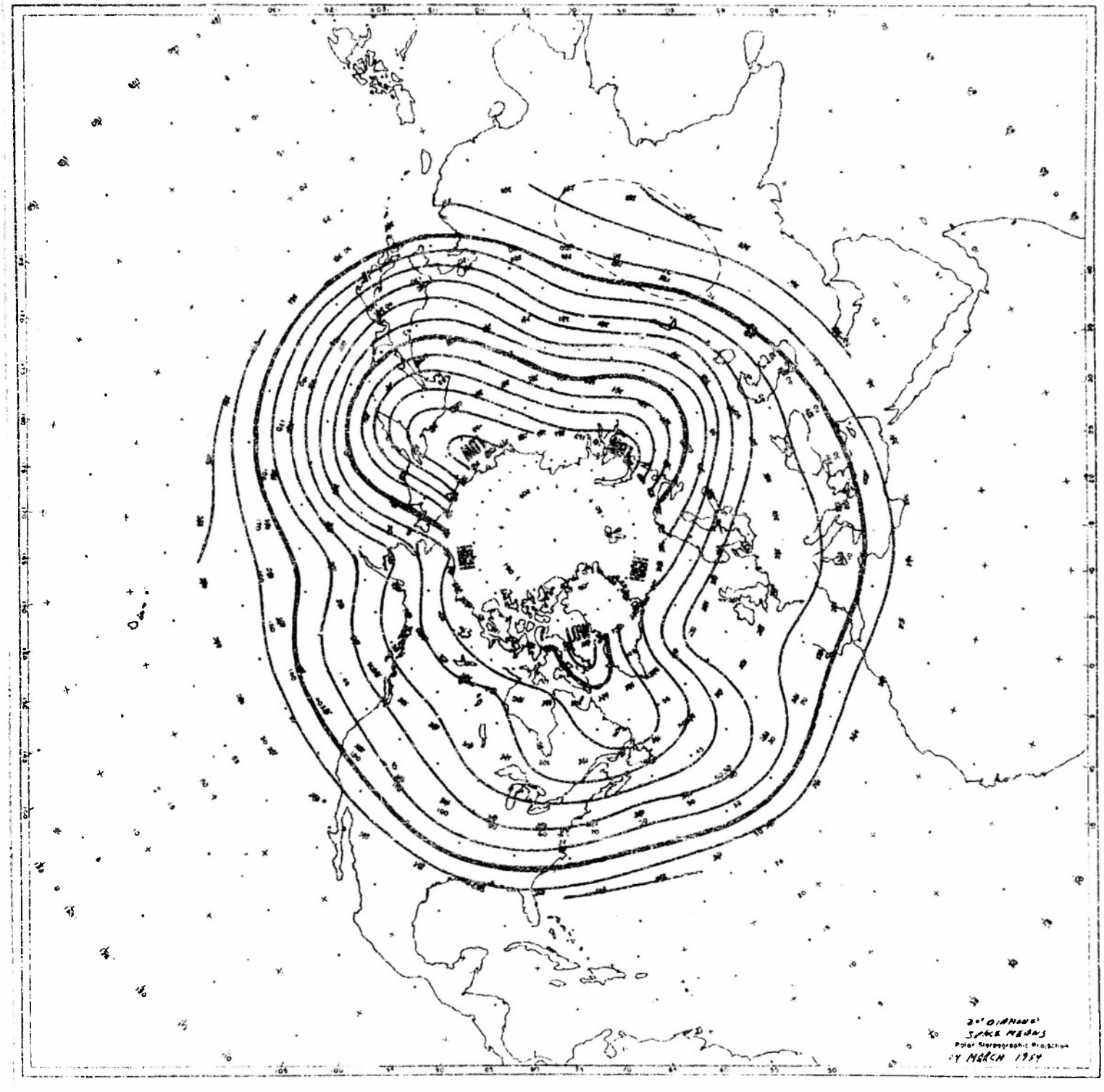
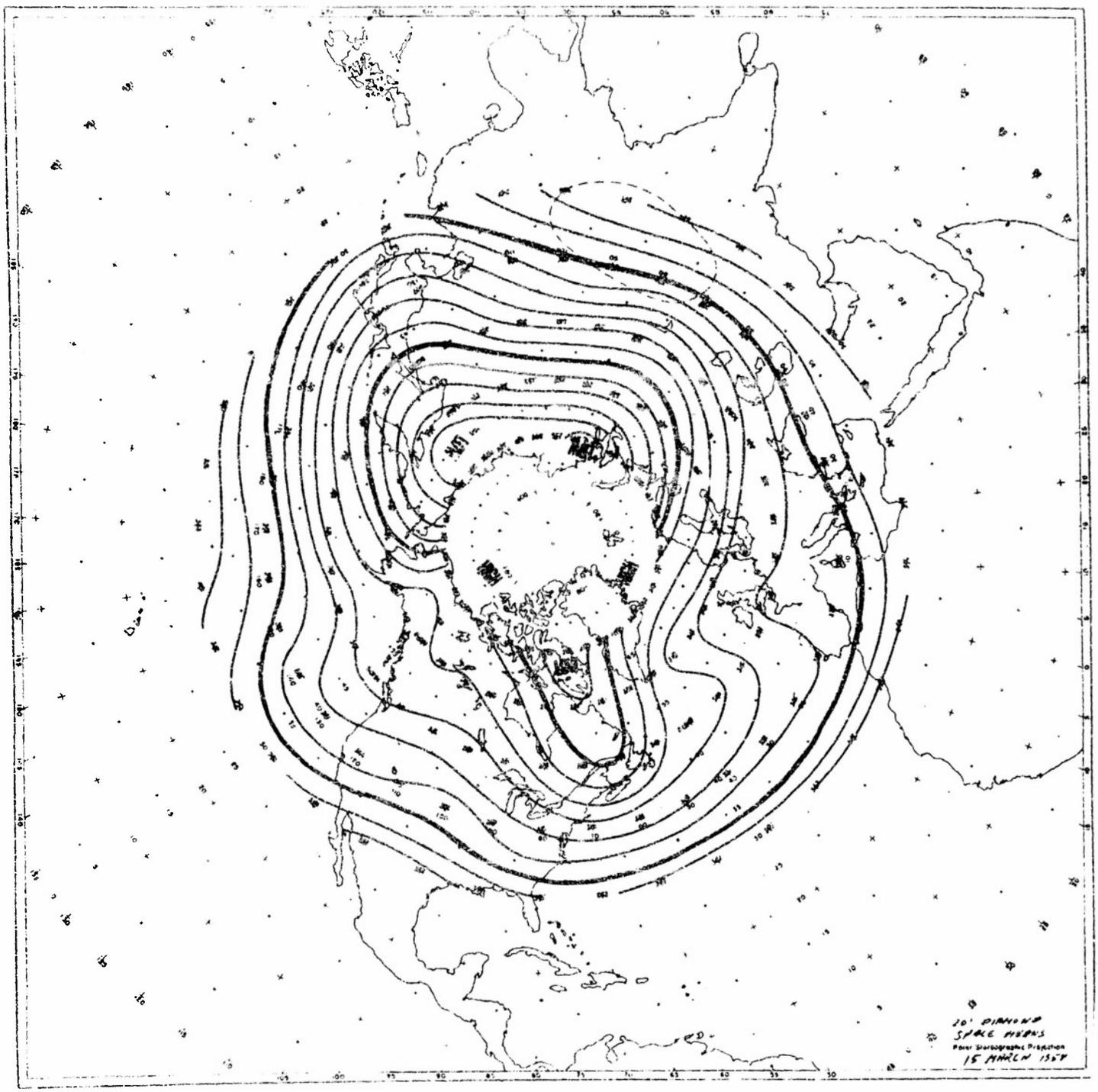
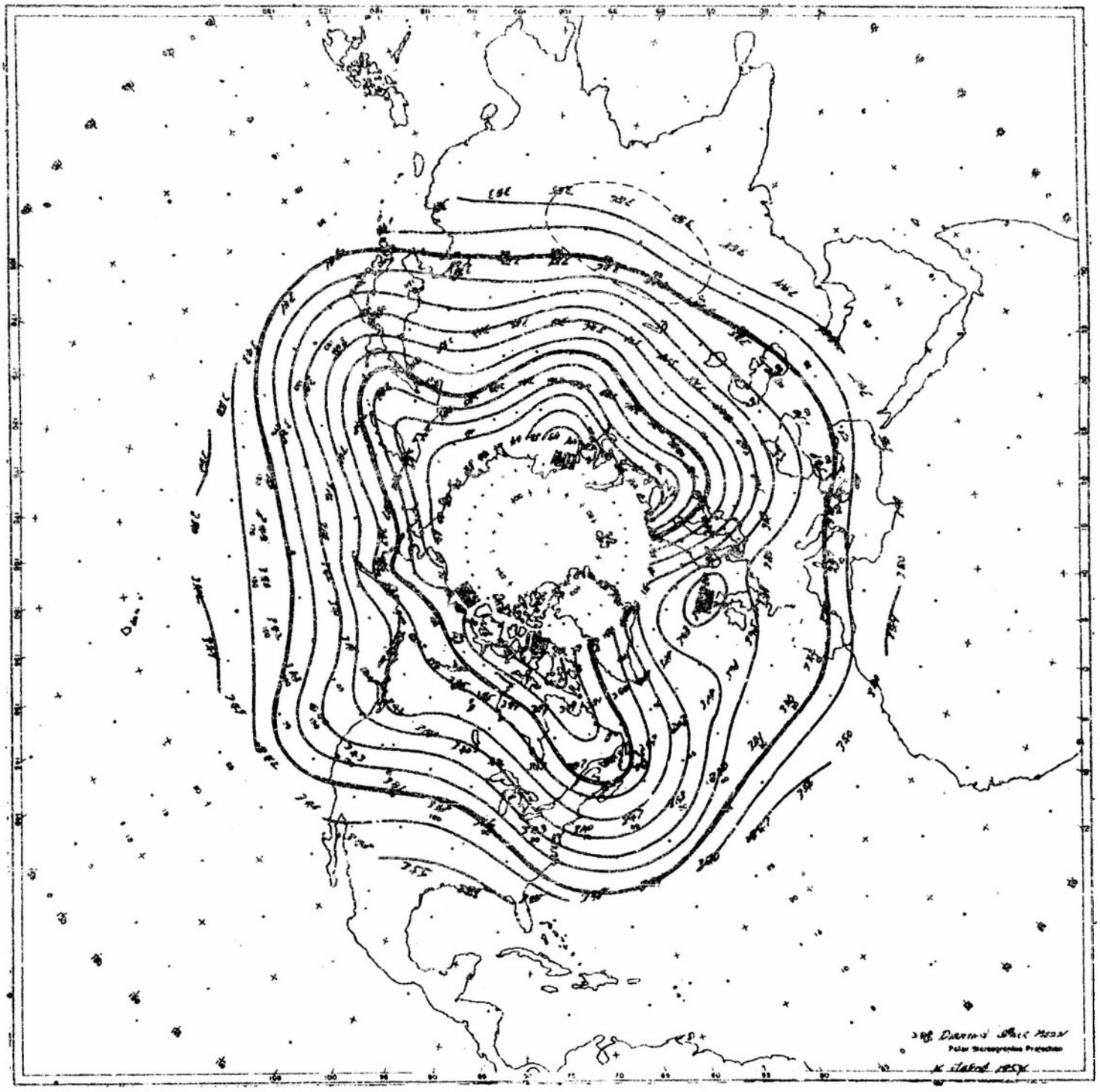
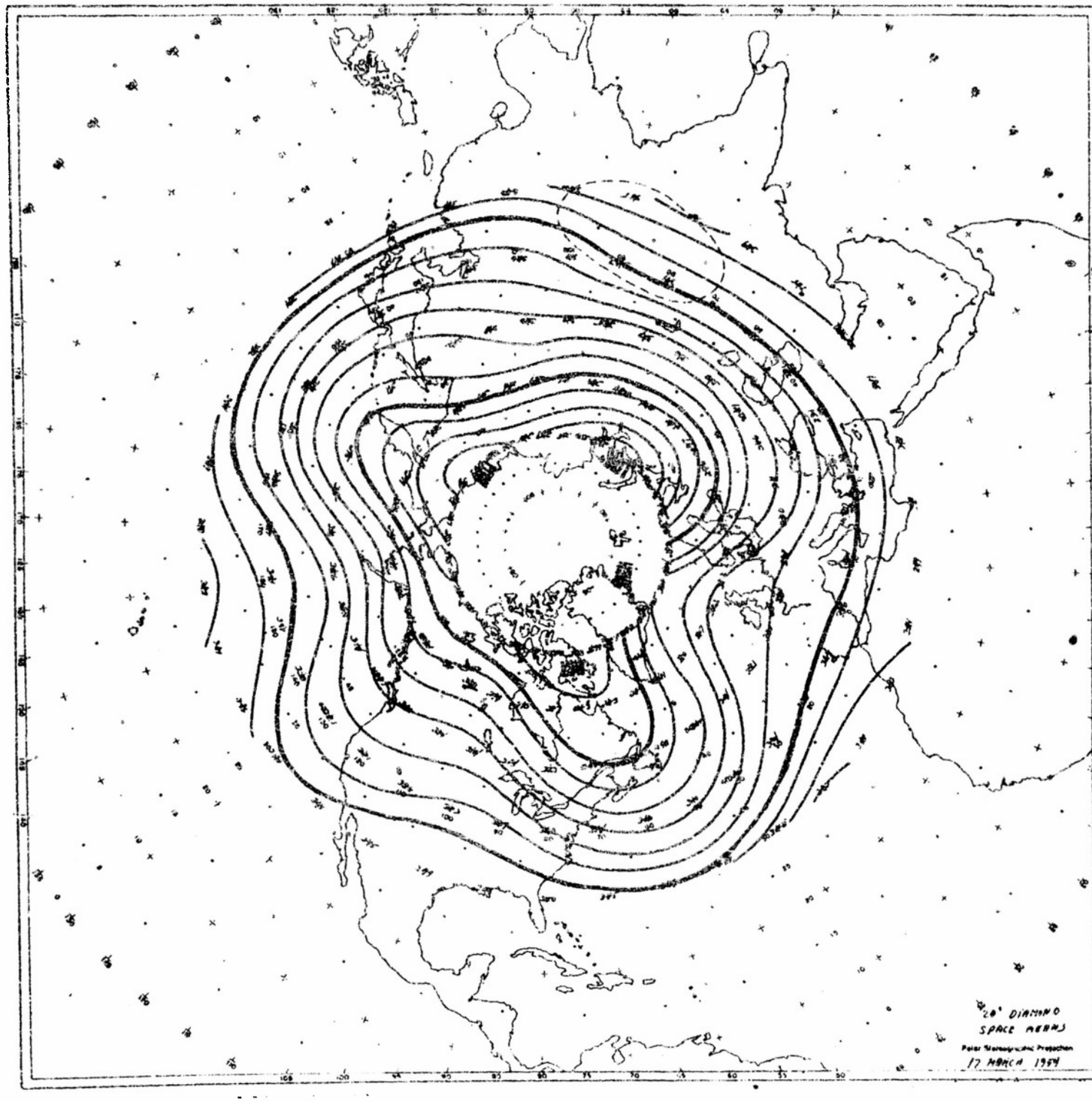
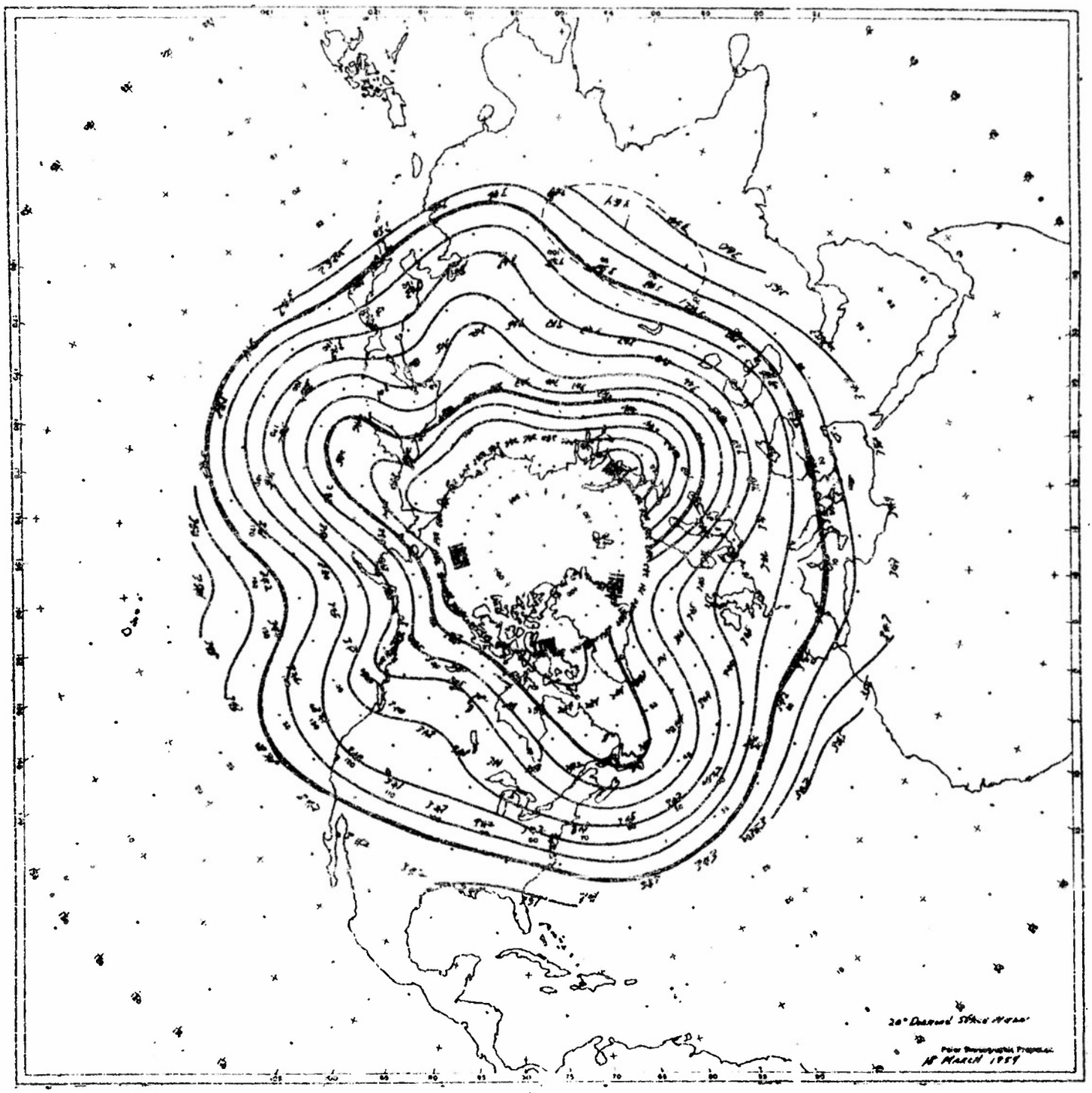
SPACE HEIGHTS
Polar Stereographic Projection
13 MARCH 1964

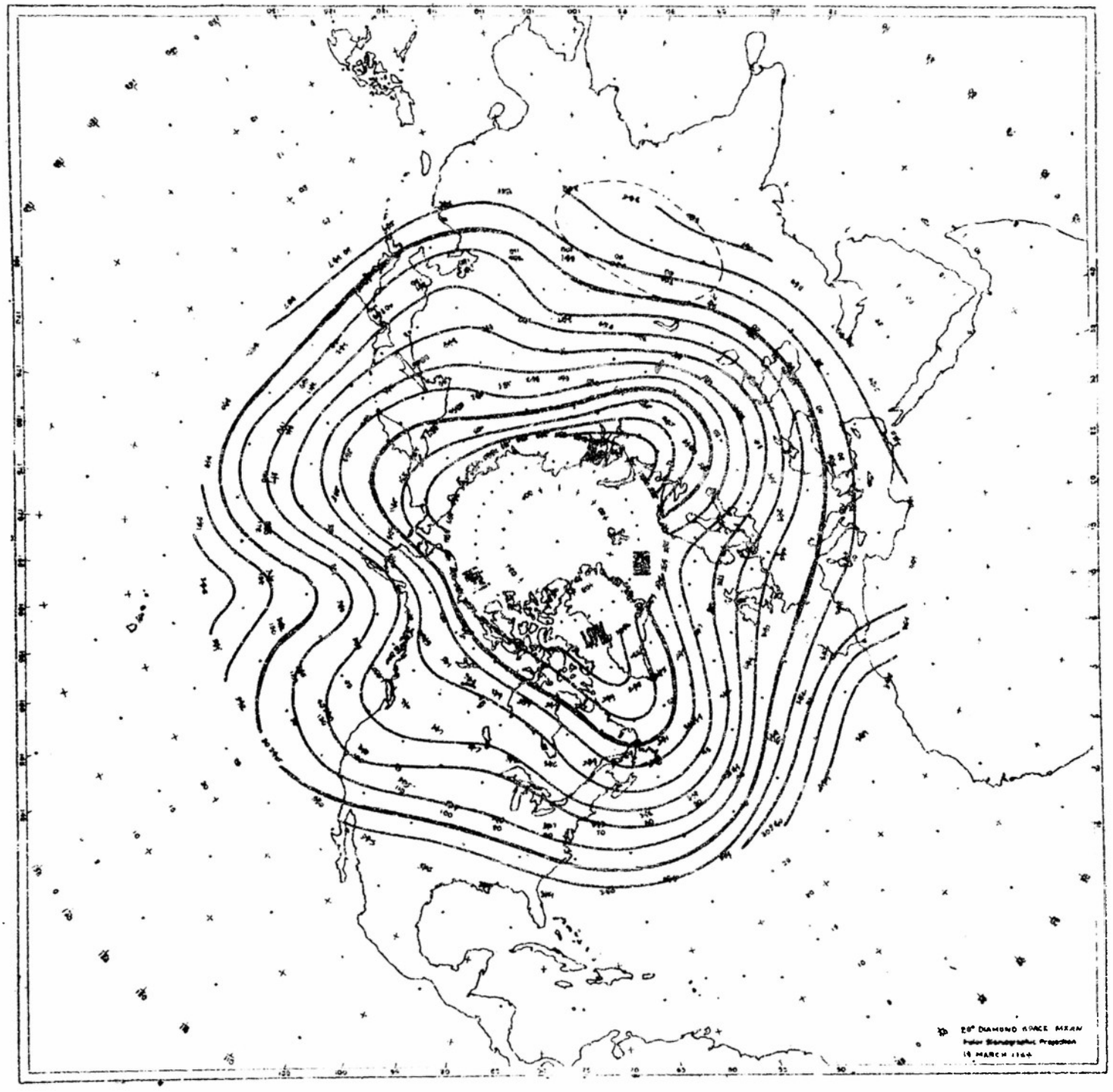

20° DIAMOND
SPACE MEANS
Polar Stereographic Projection
14 MARCH 1954

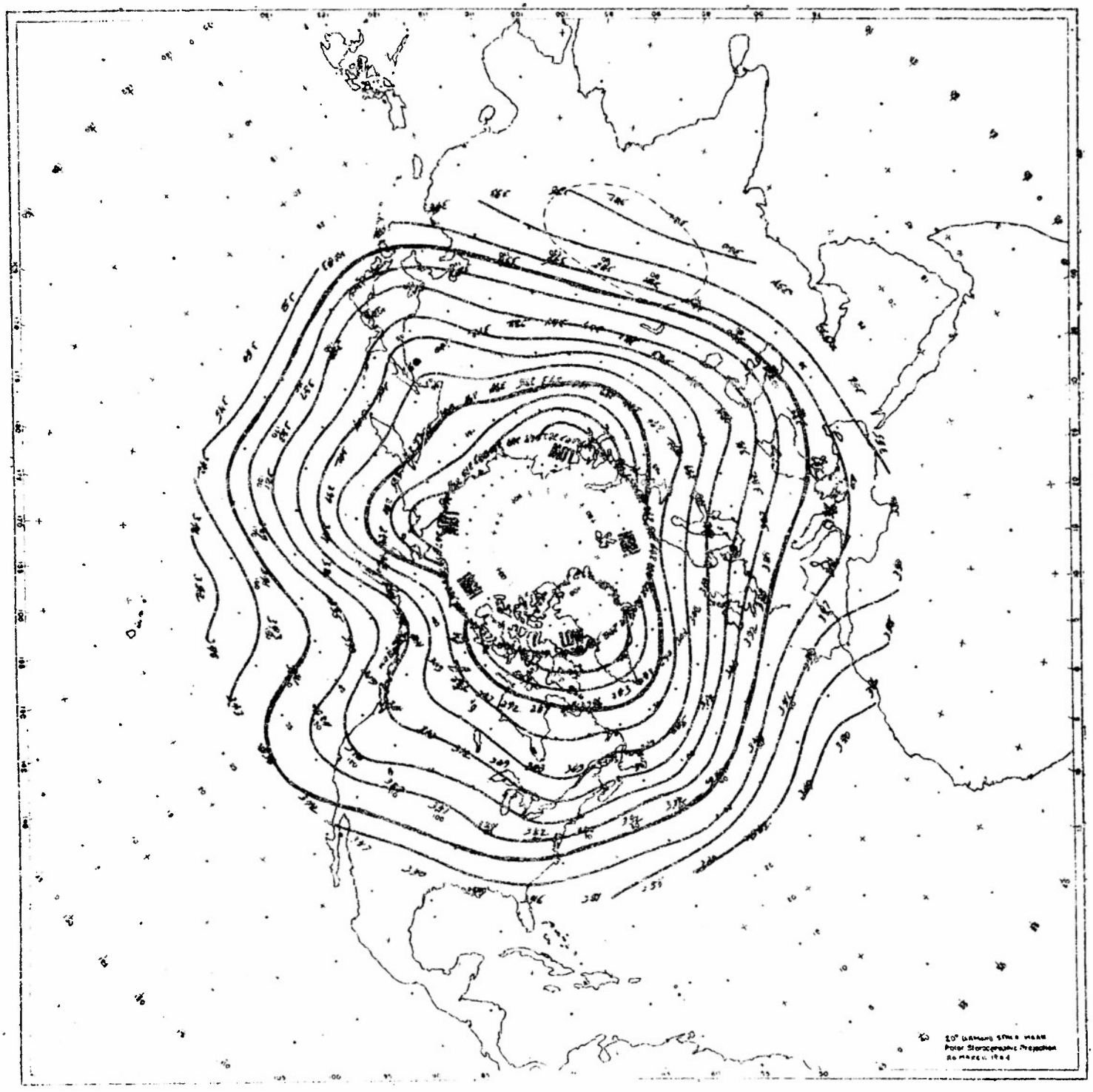

20° DIAMOND
SPACE MEANS
Polar Stereographic Projection
15 MARCH 1957

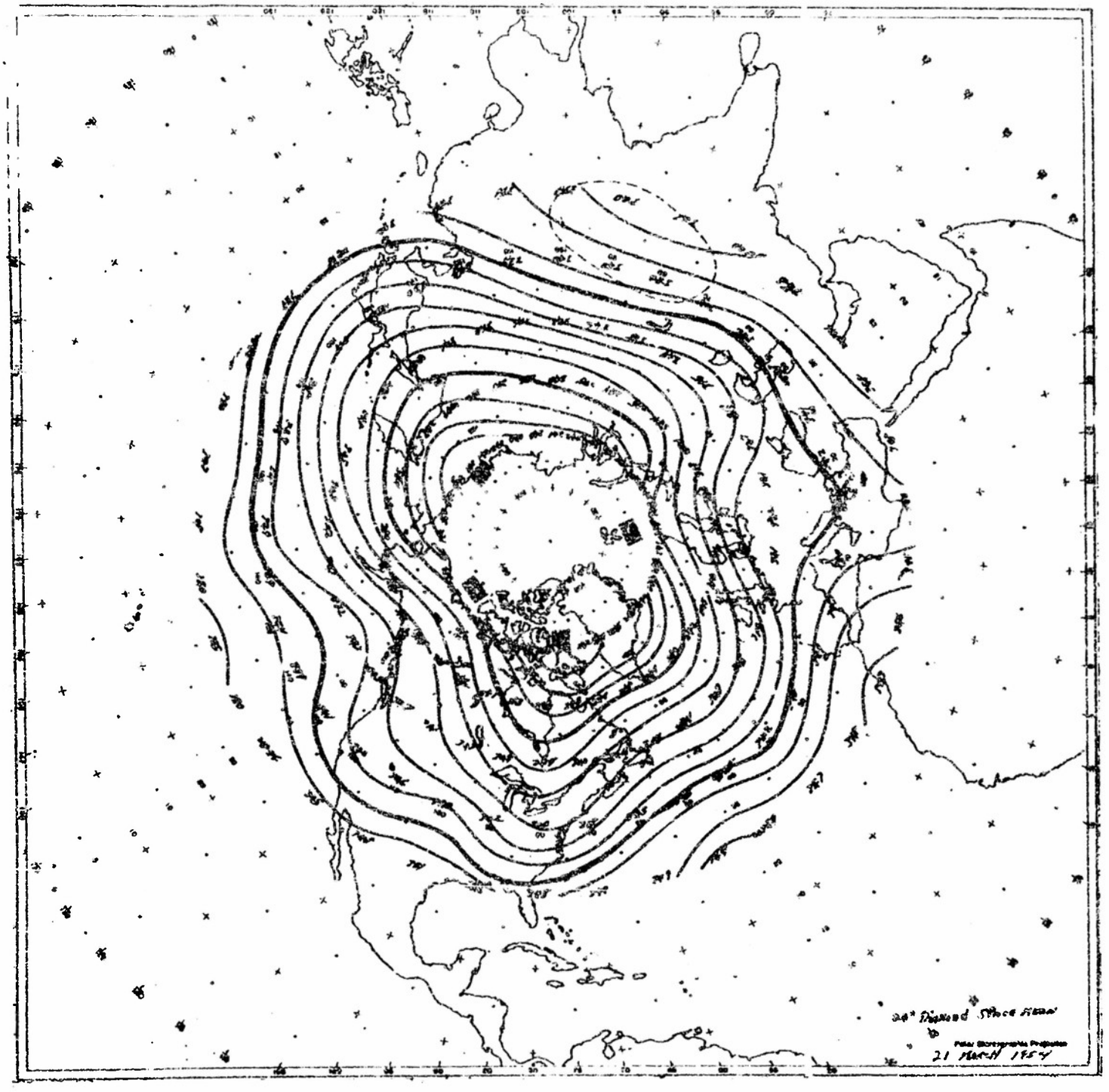


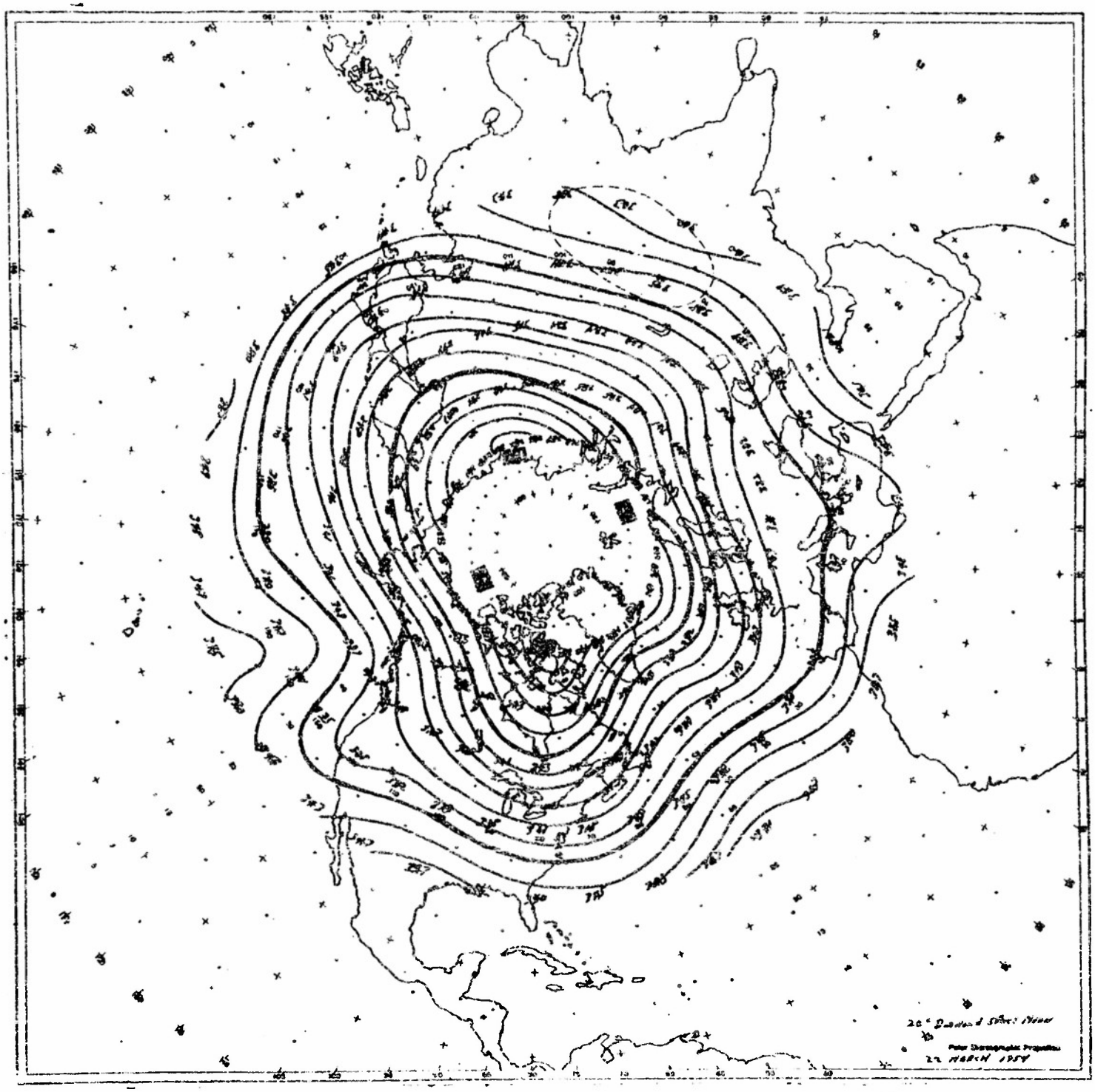

20° DIAMOND
SPACE MEANS
Polar Stereographic Projection
17 MARCH 1964

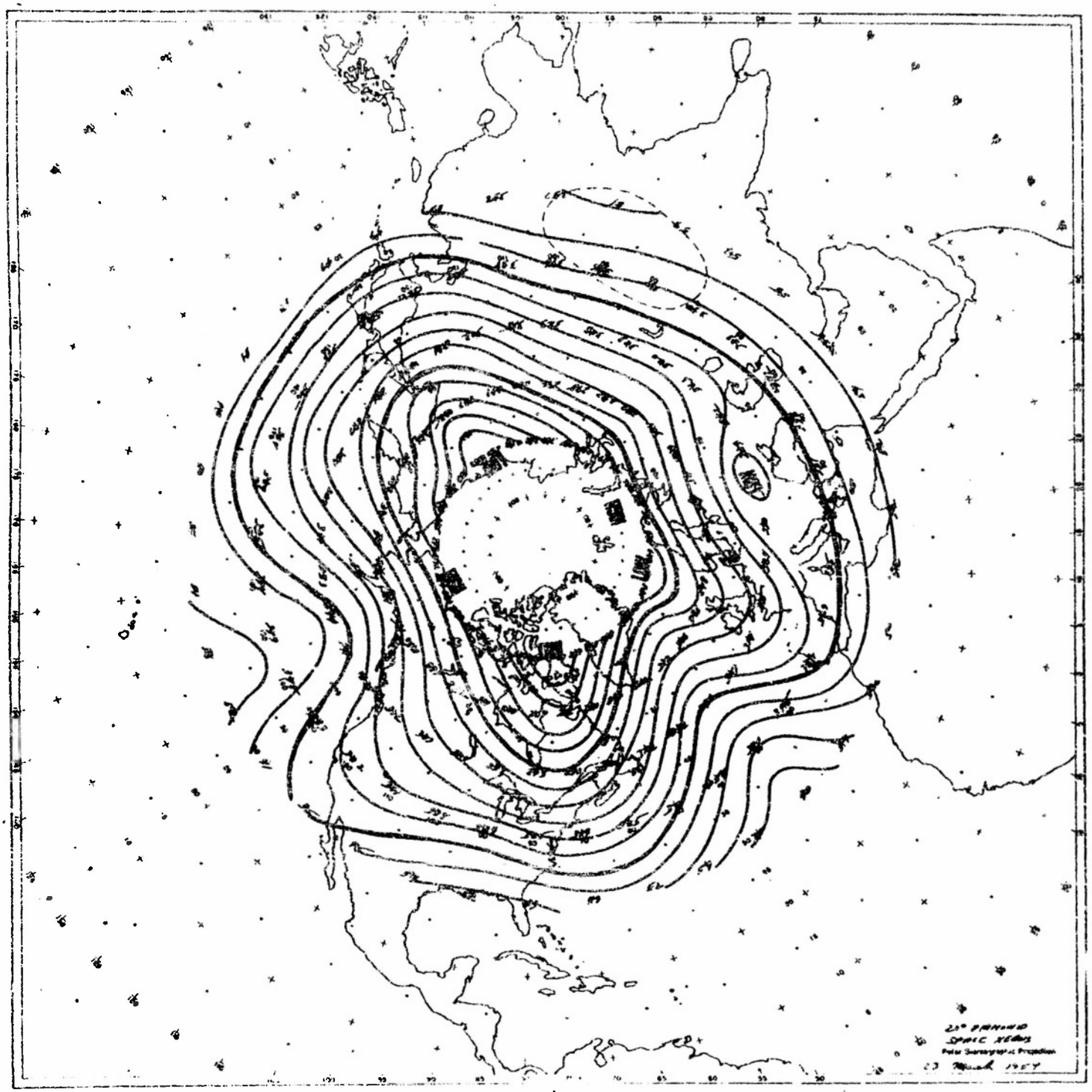

20° Dynamic Surface Height
Polar Stereographic Projection
1st MARCH 1959

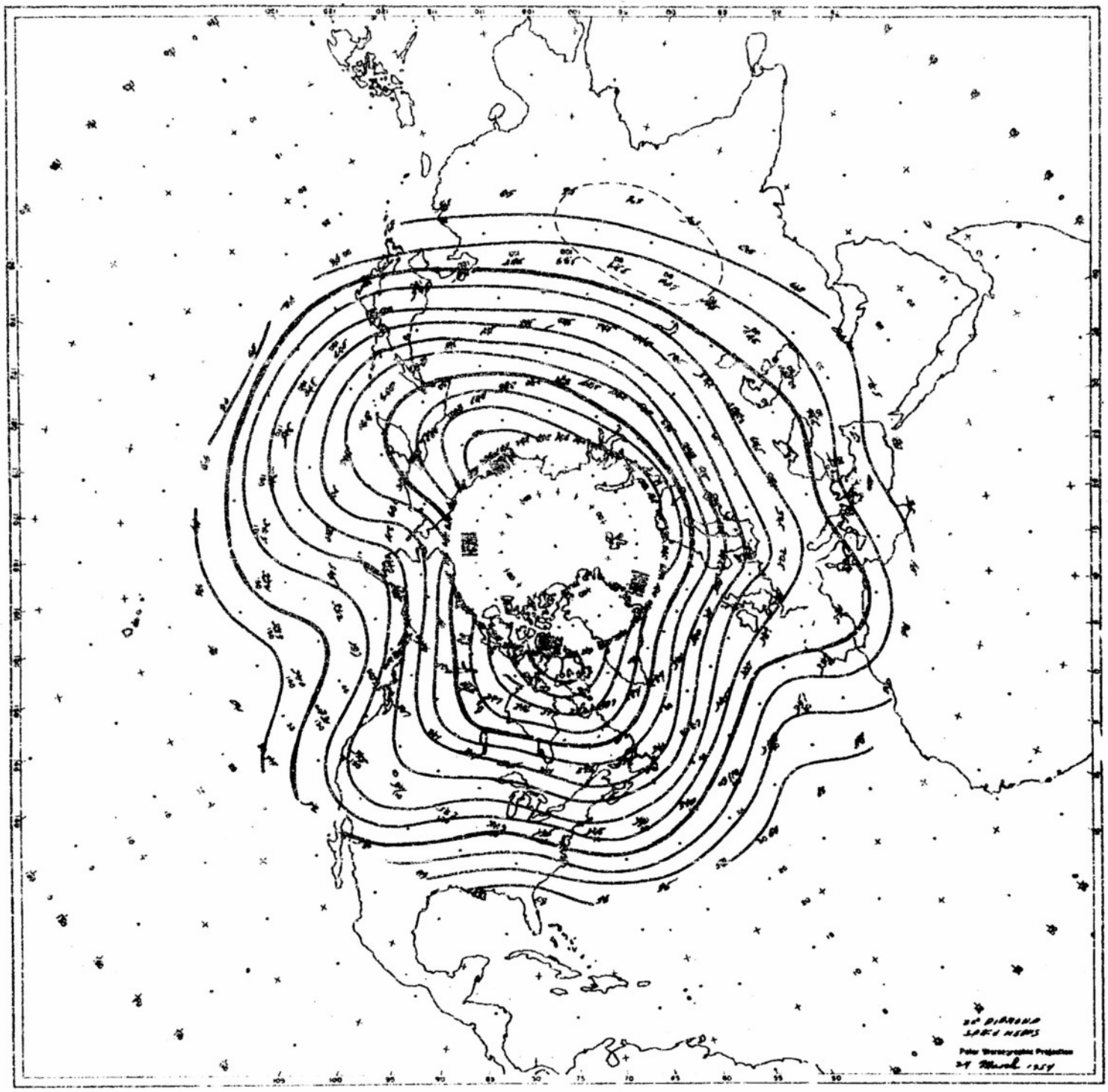

20° DIAMOND HEAD MEAN
Polar Stereographic Projection
16 MARCH 1964

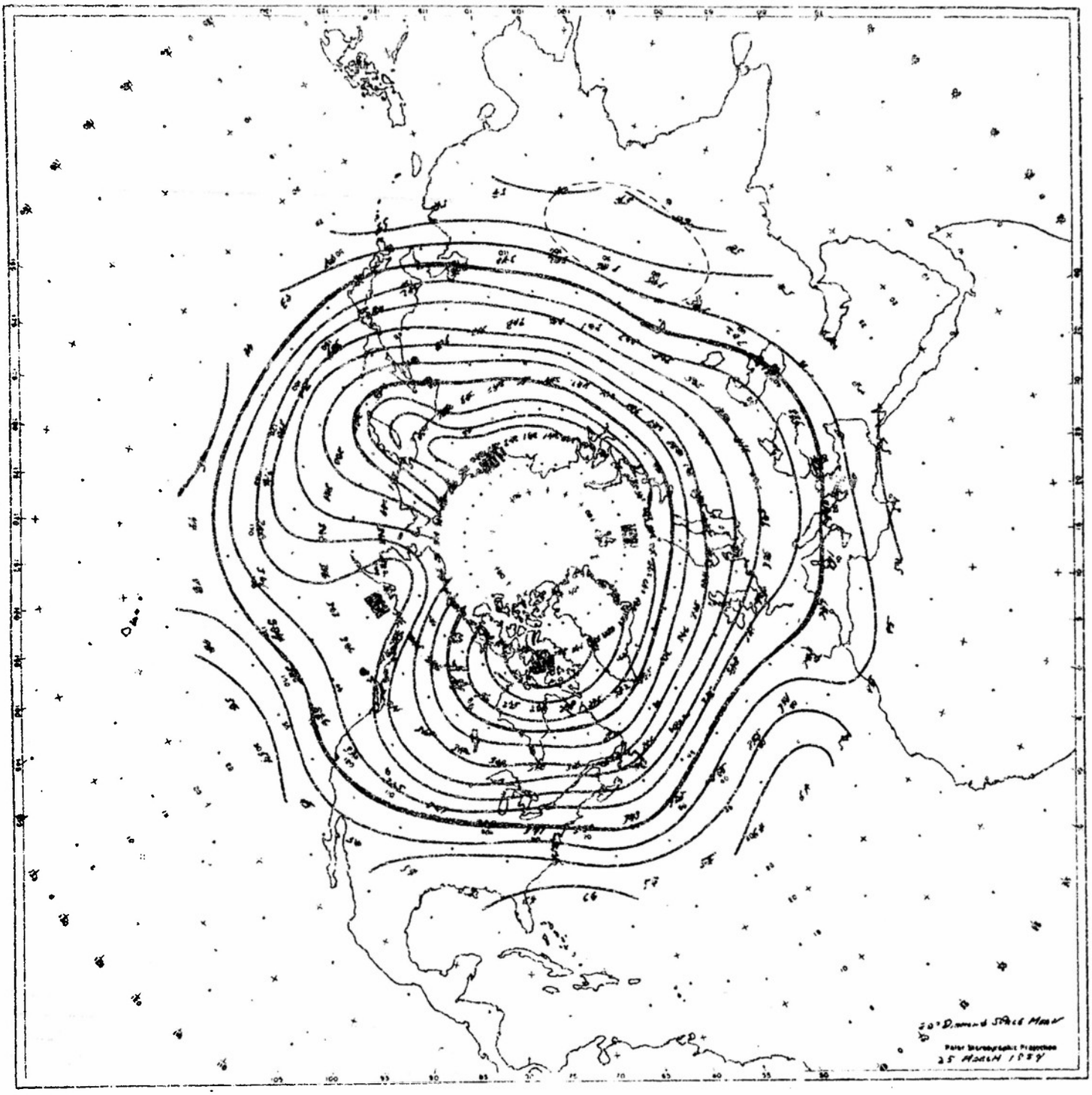


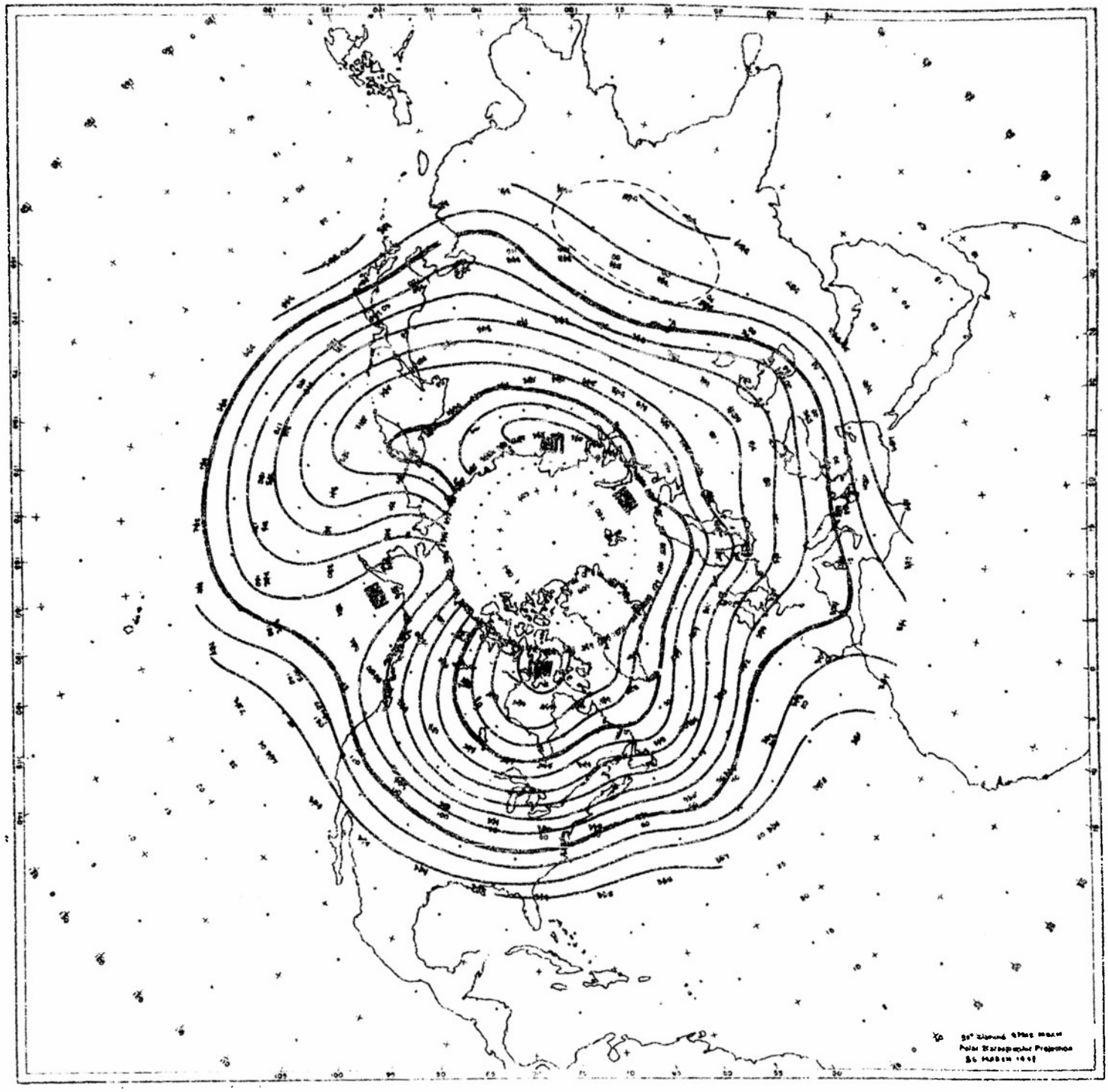

Diamond Shoe Head
Polar Stereographic Projection
21 March 1954

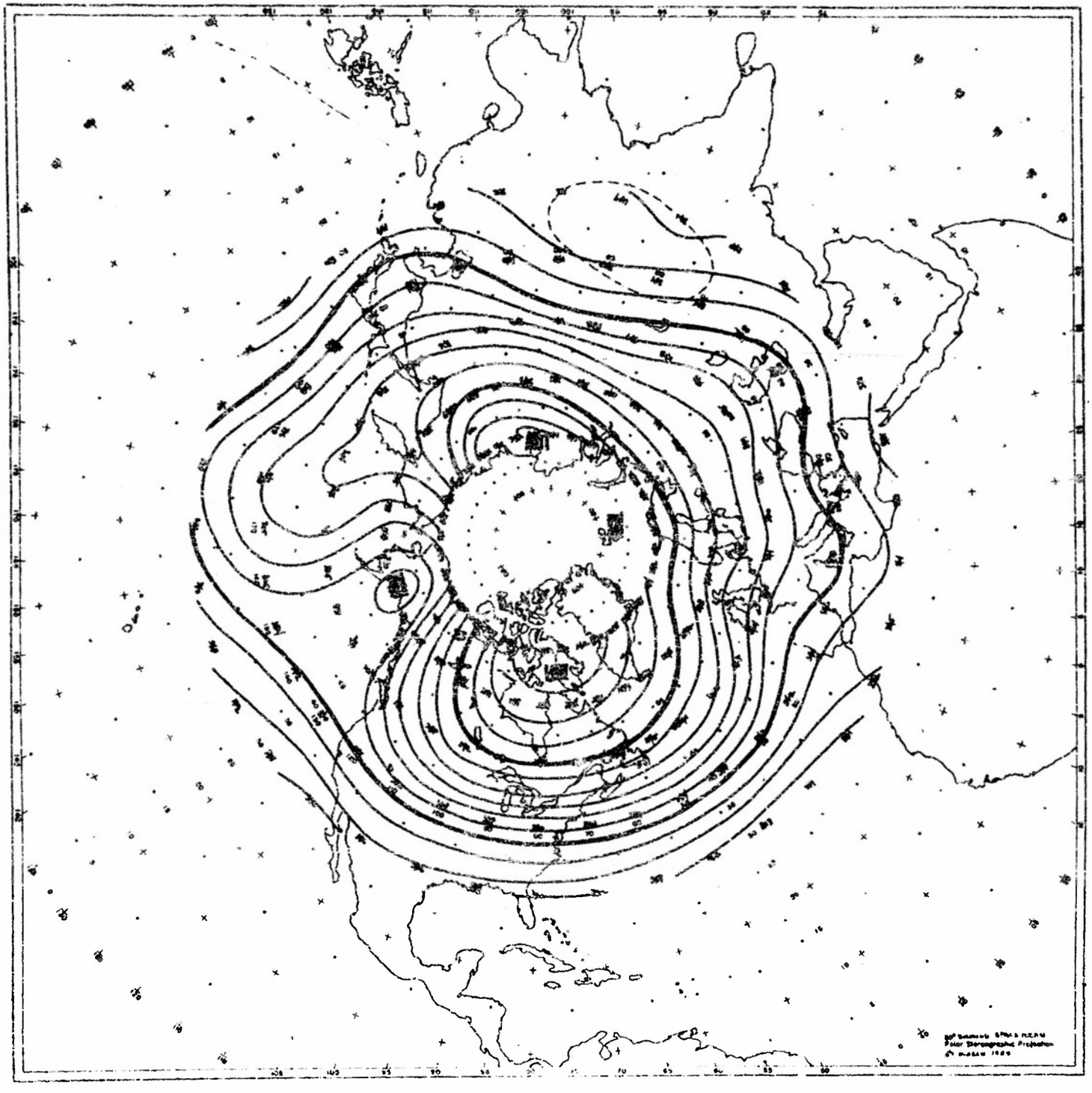

20° Standard Sphere Datum
Polar Stereographic Projection
22 MARCH 1954

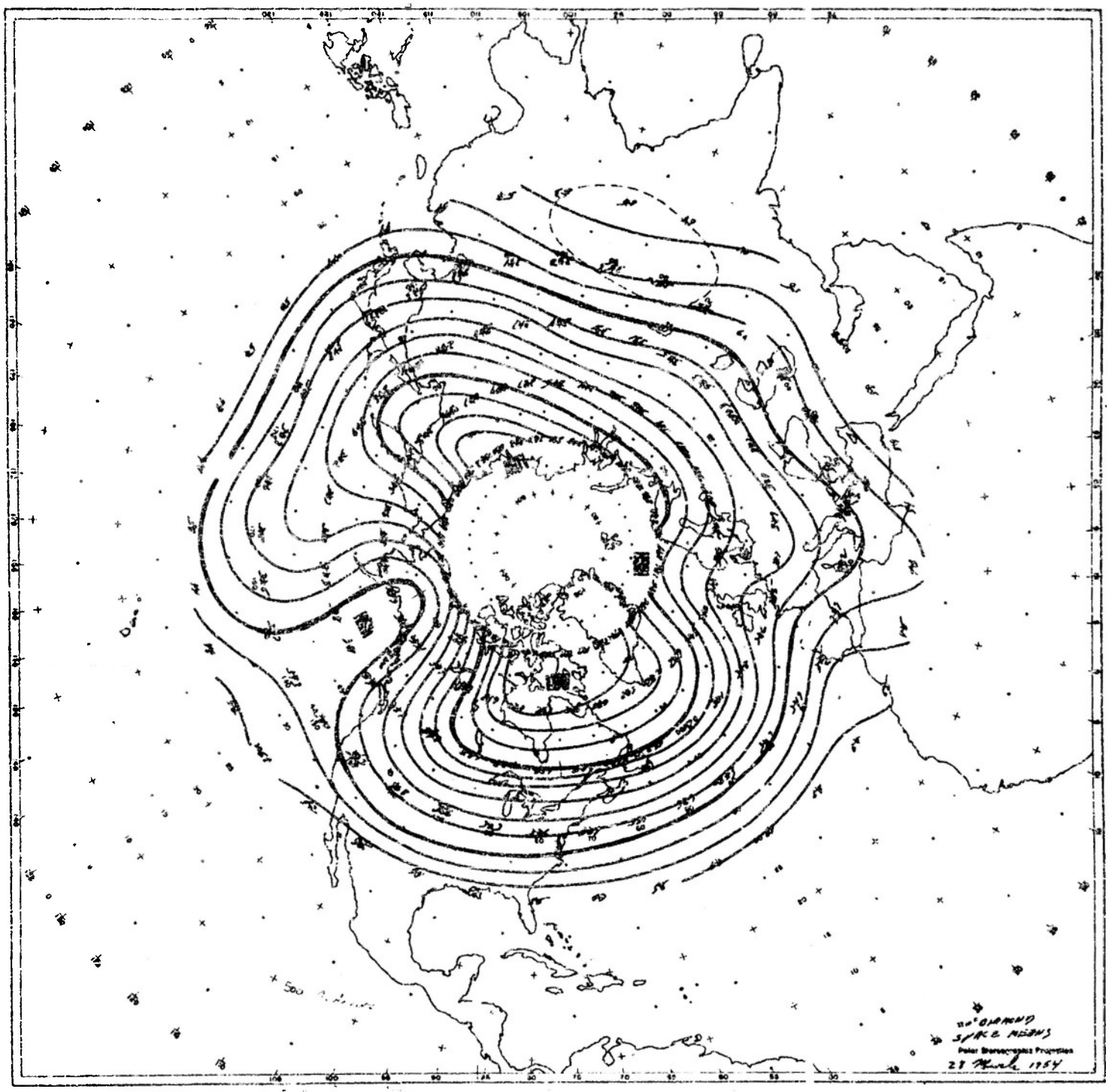

25° DIAMOND
SPACE XEROX
Polar Stereographic Projection
23 March 1959

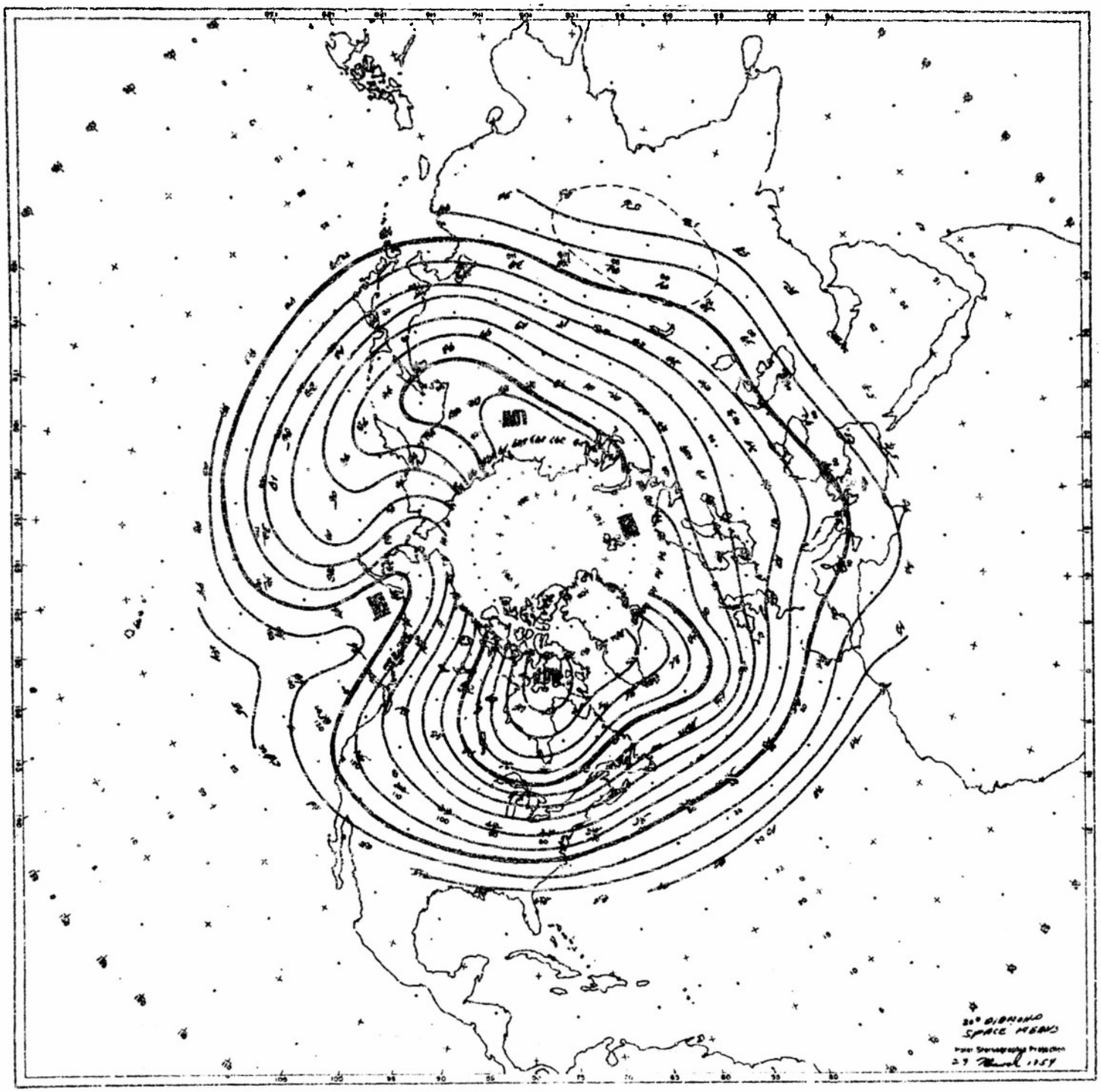

Polar Stereographic Projection

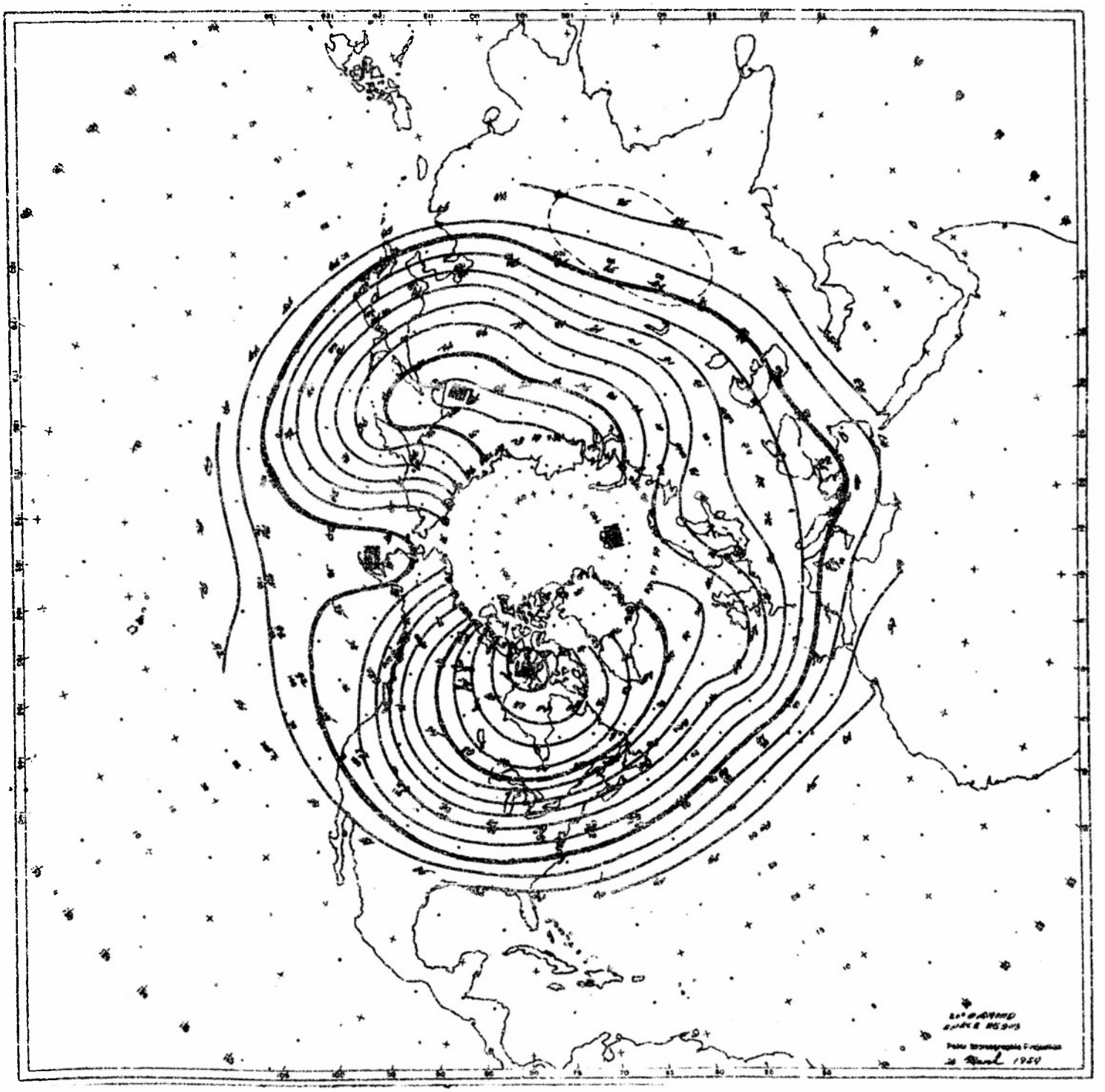

20° Diamond Space Map
Polar Stereographic Projection
25 MARCH 1959

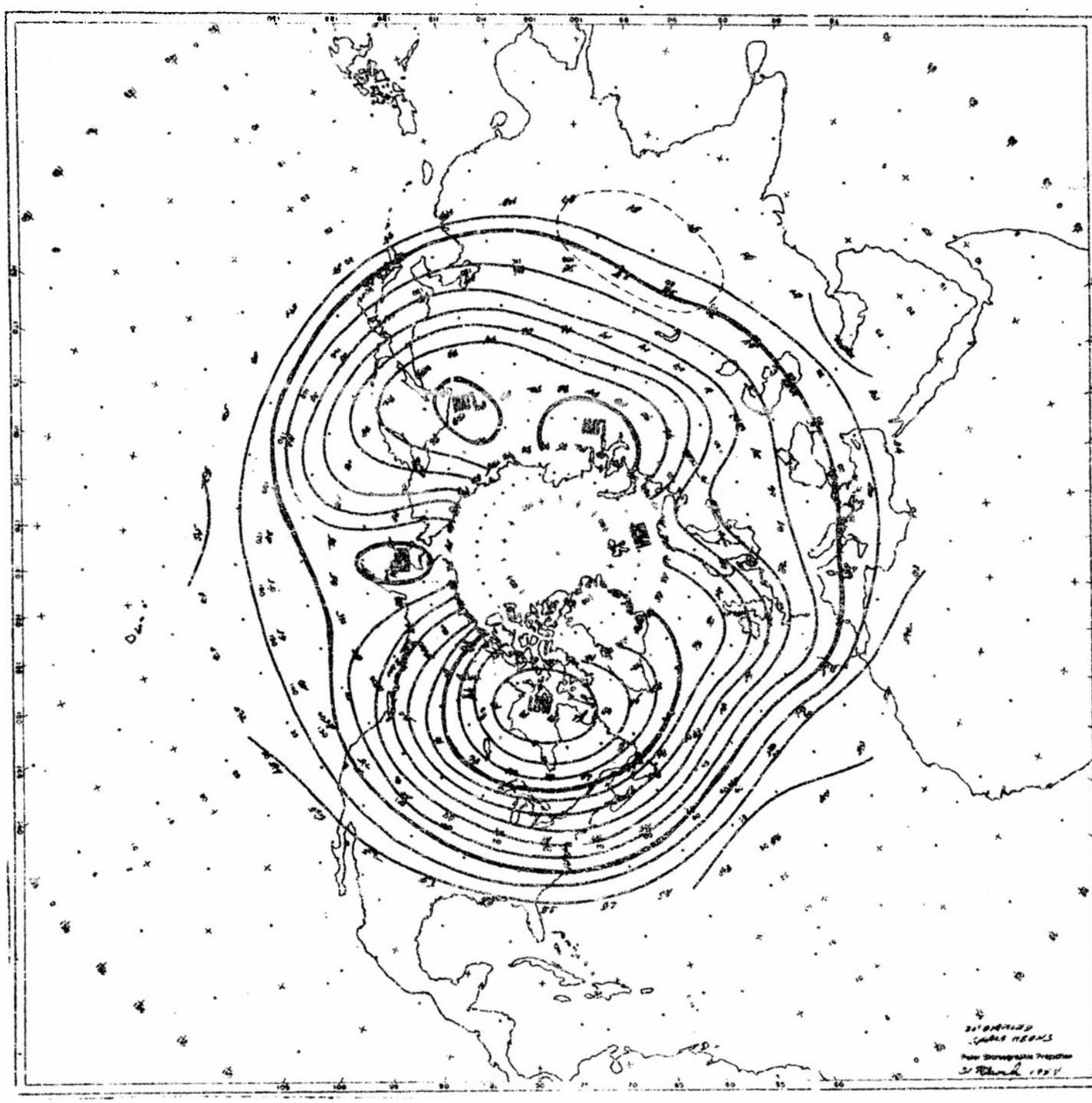


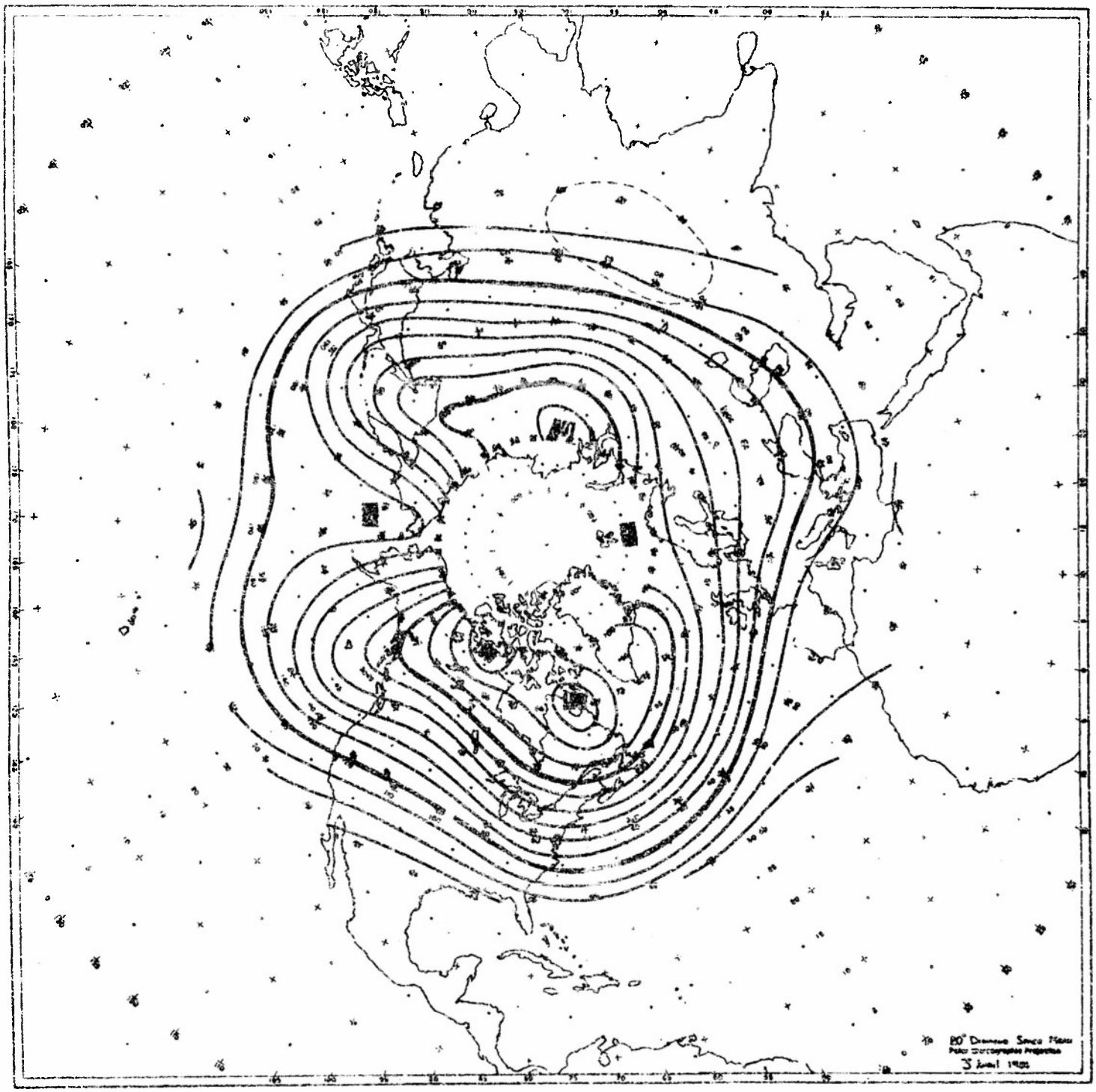


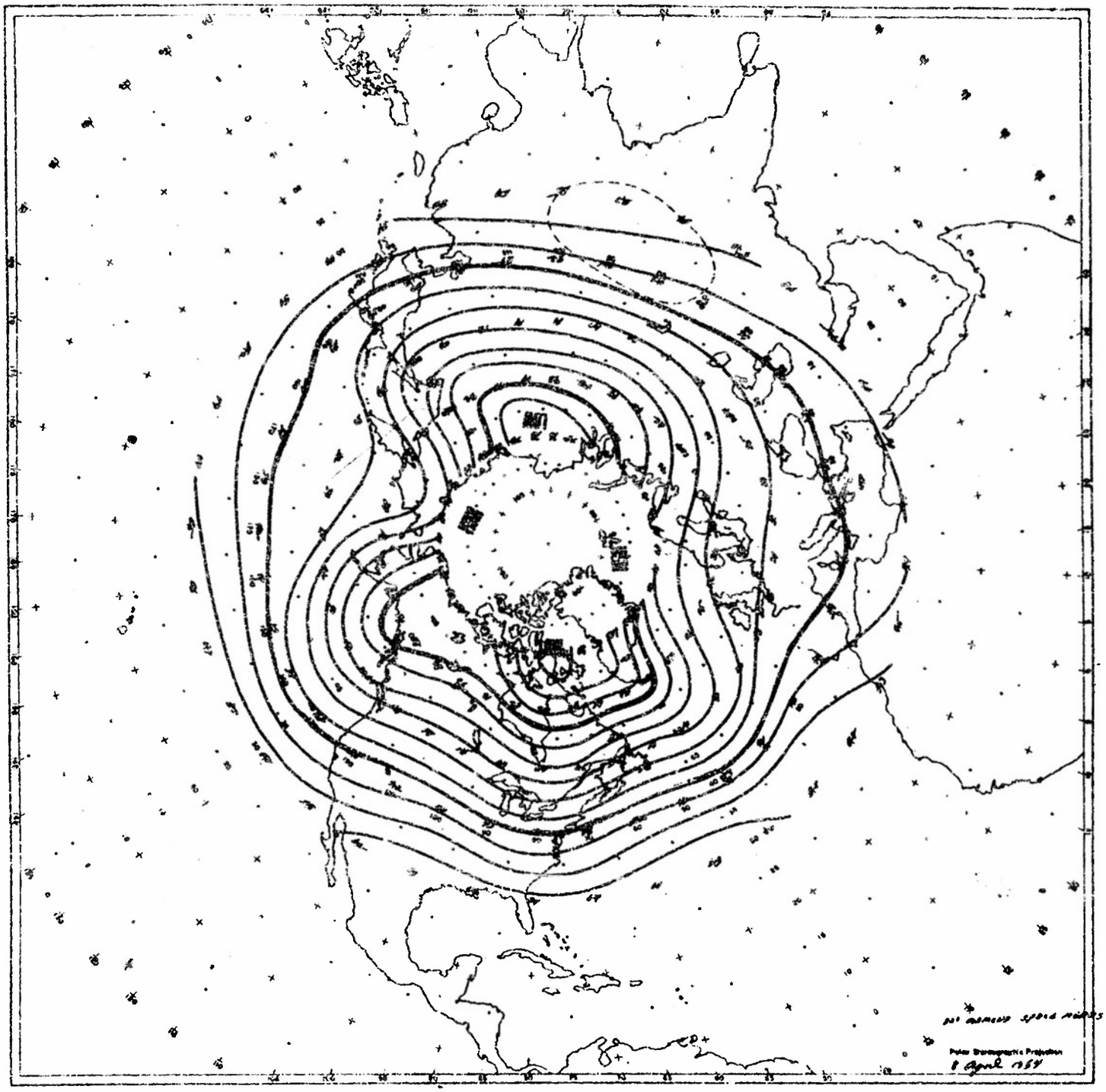

Diamond
Surface Winds
Polar Stereographic Projection
27 March 1954

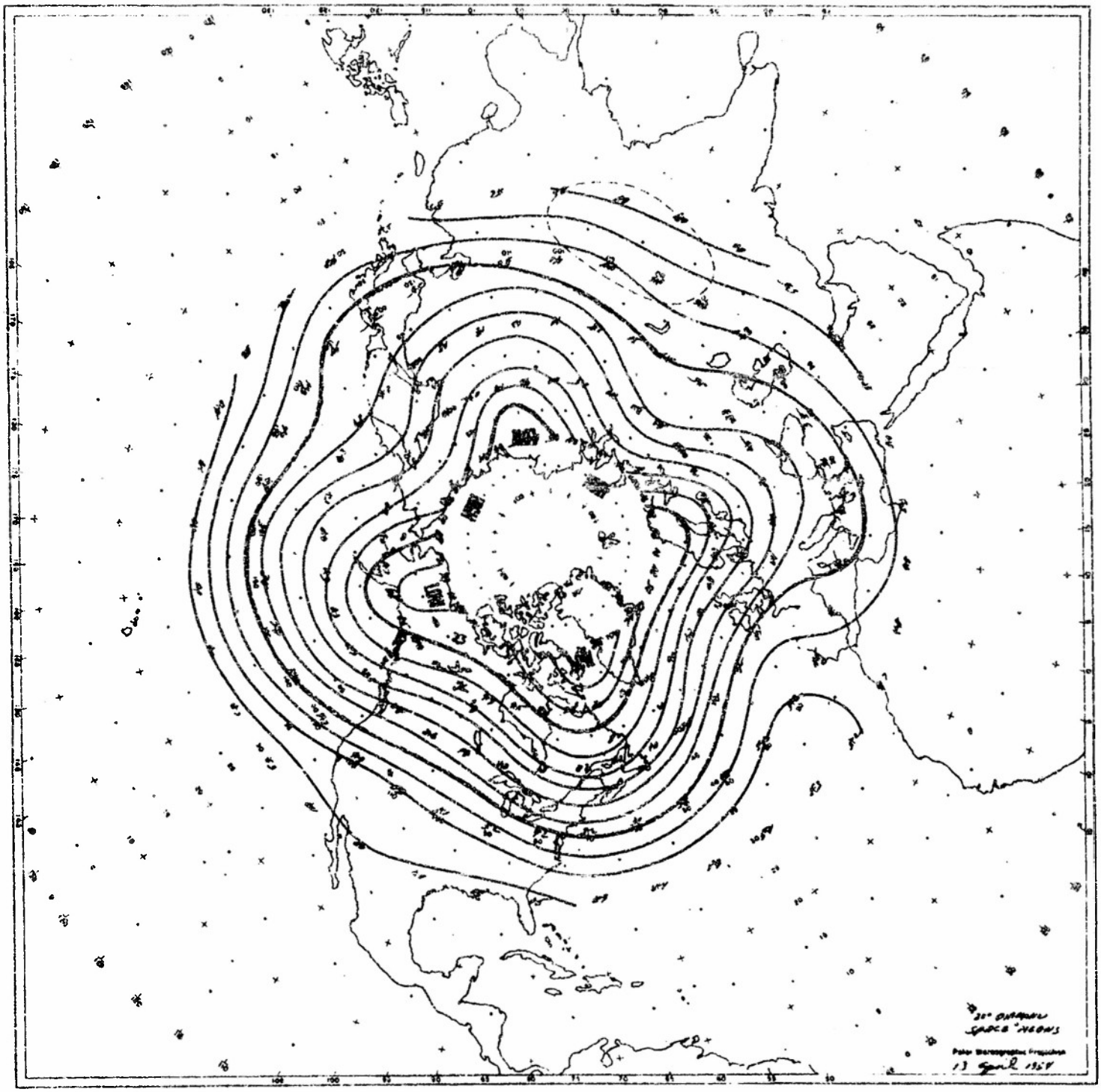

SPACE MEANS

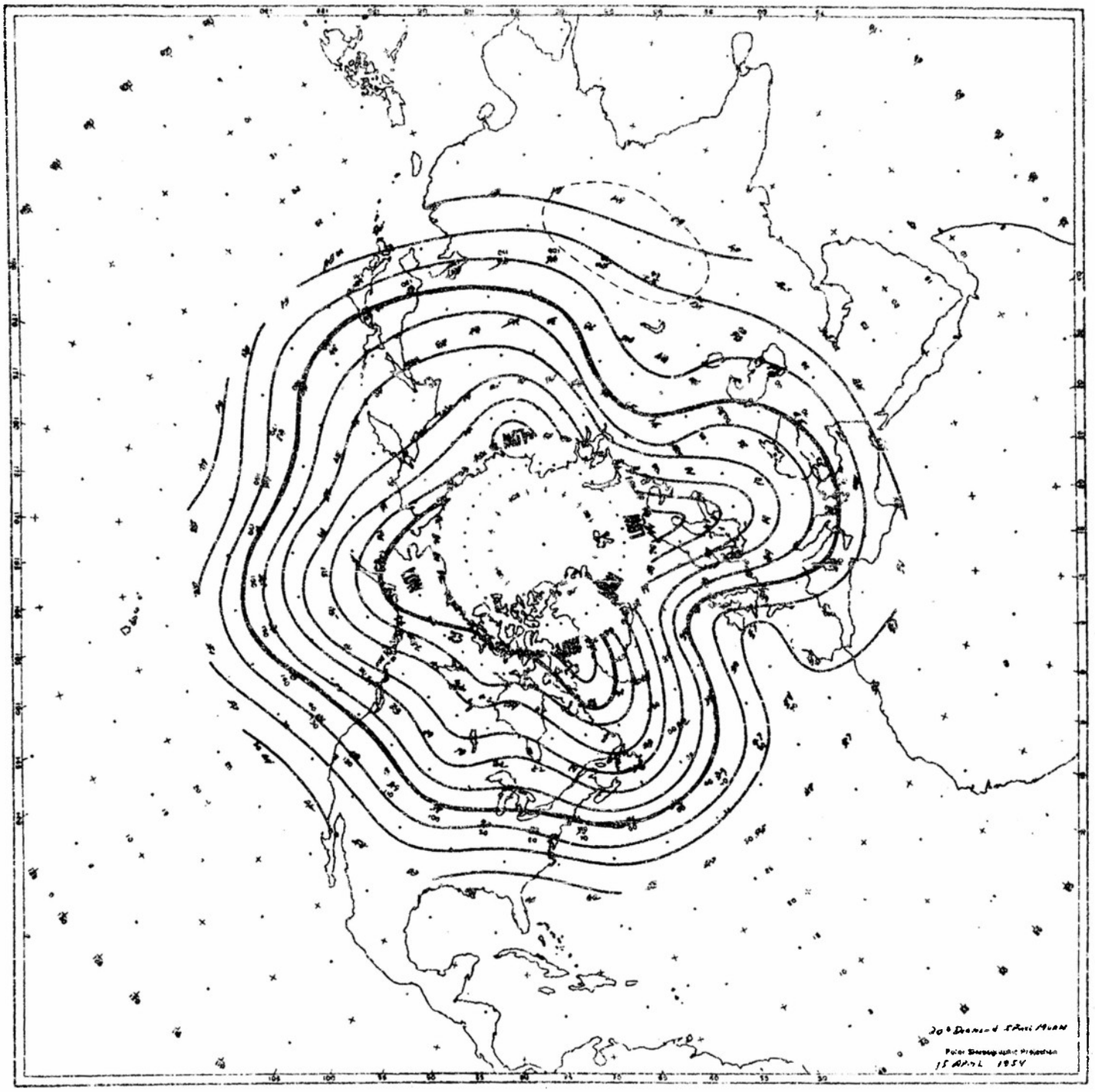


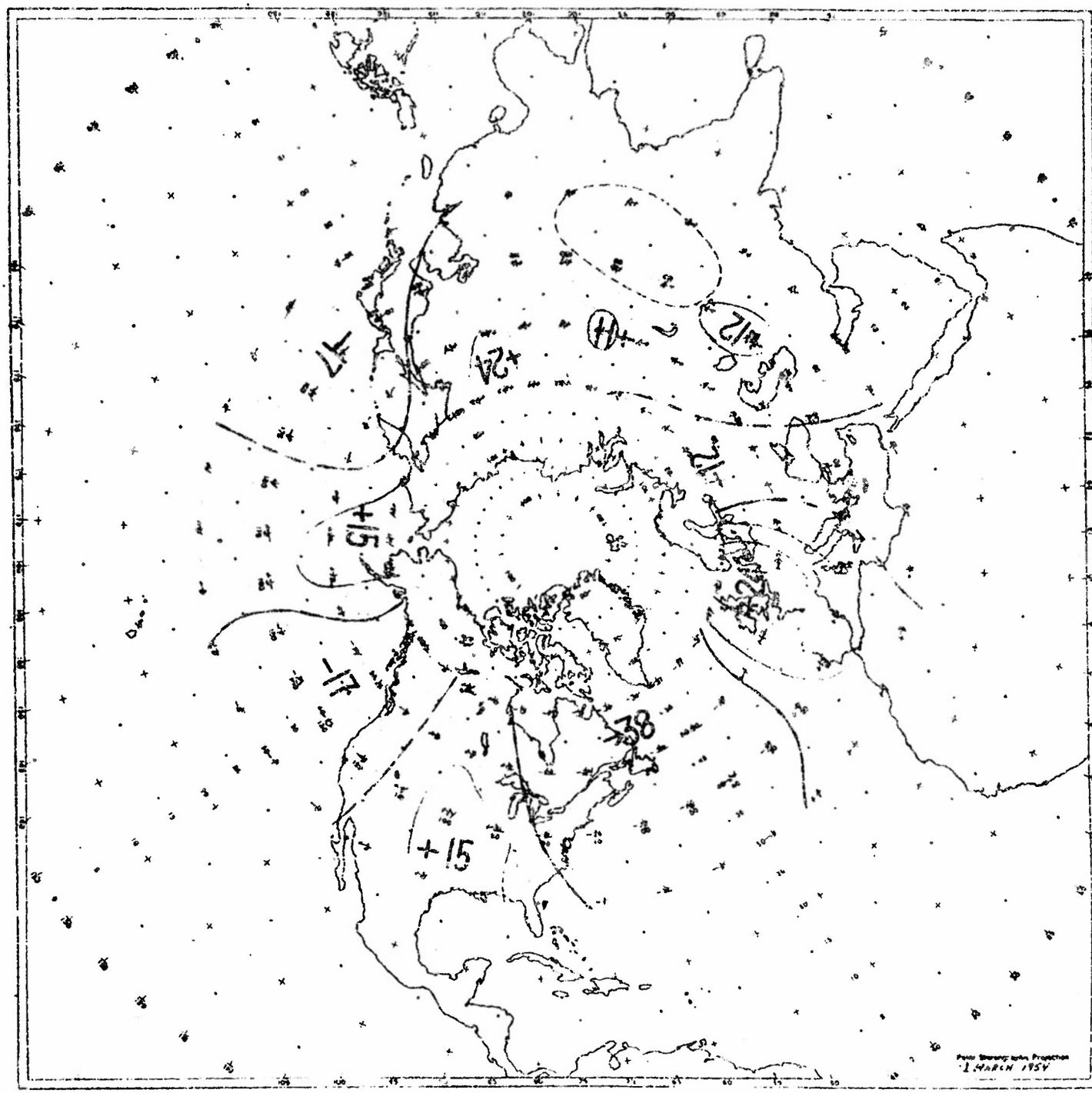





Polar Stereographic Projection
8 April 1954




30° Standard Parallel North
Polar Stereographic Projection
15 APRIL 1954


+15
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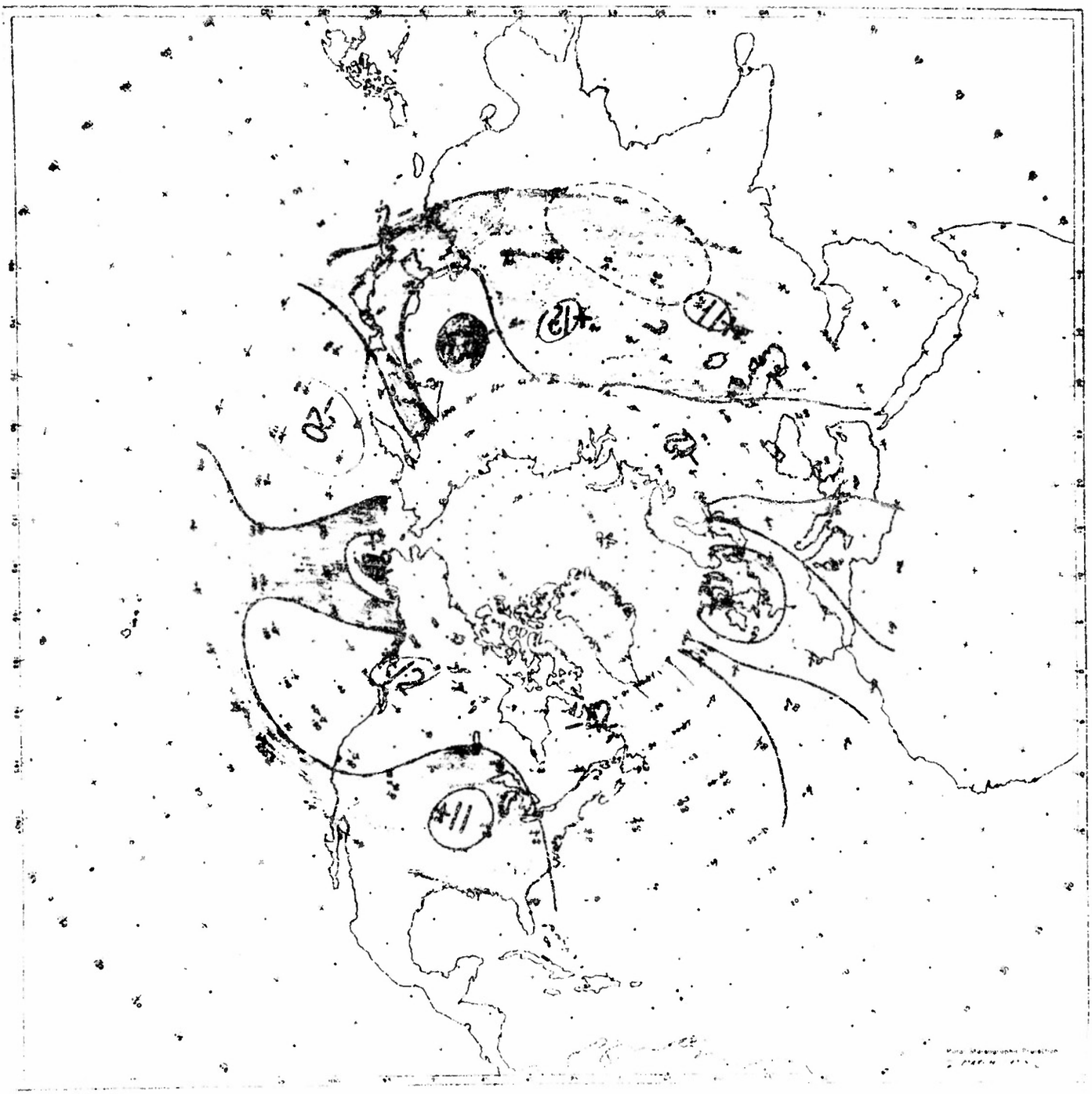
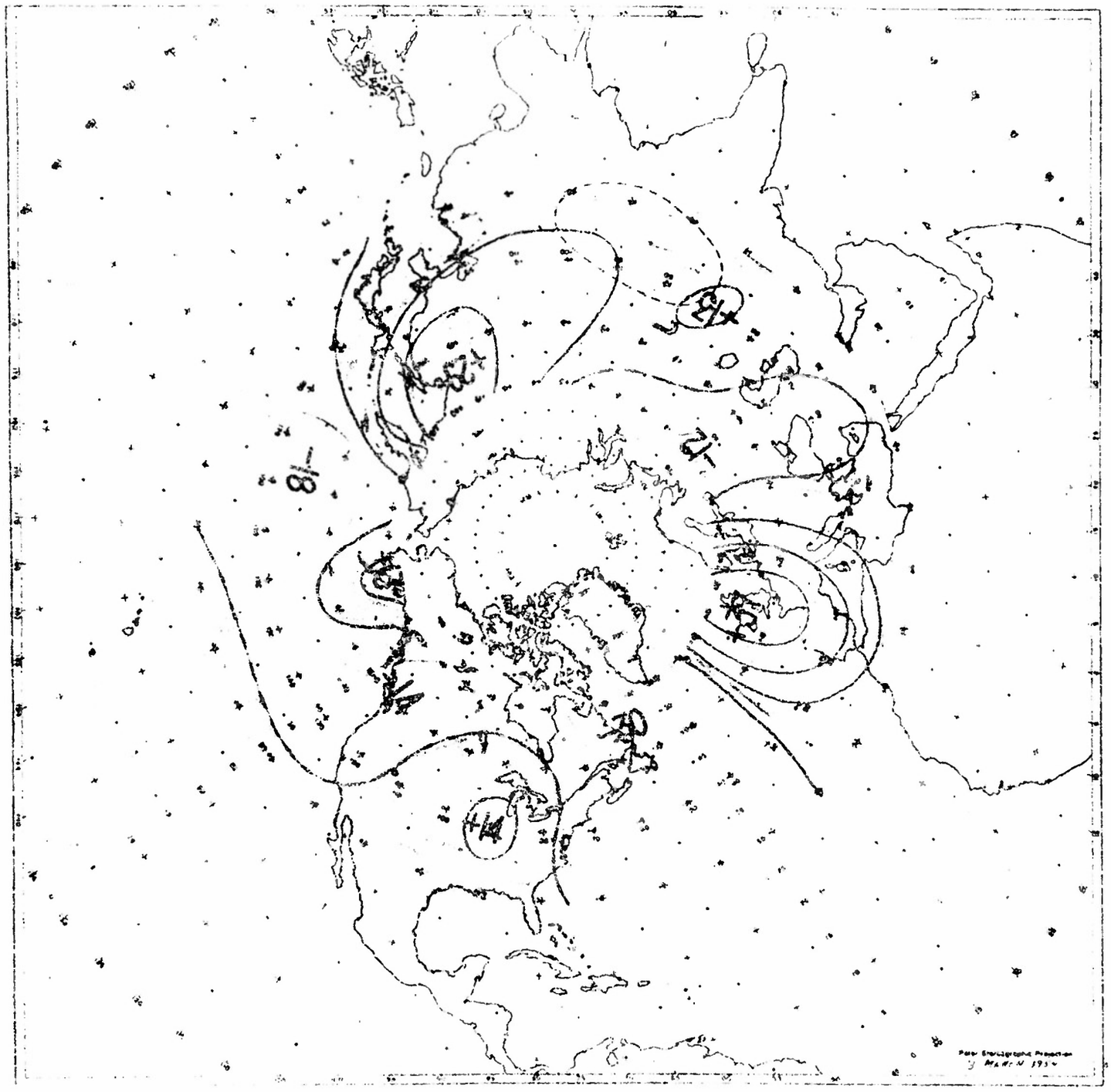
-12
-22
Polar Stereographic Projection
1 MARCH 1954

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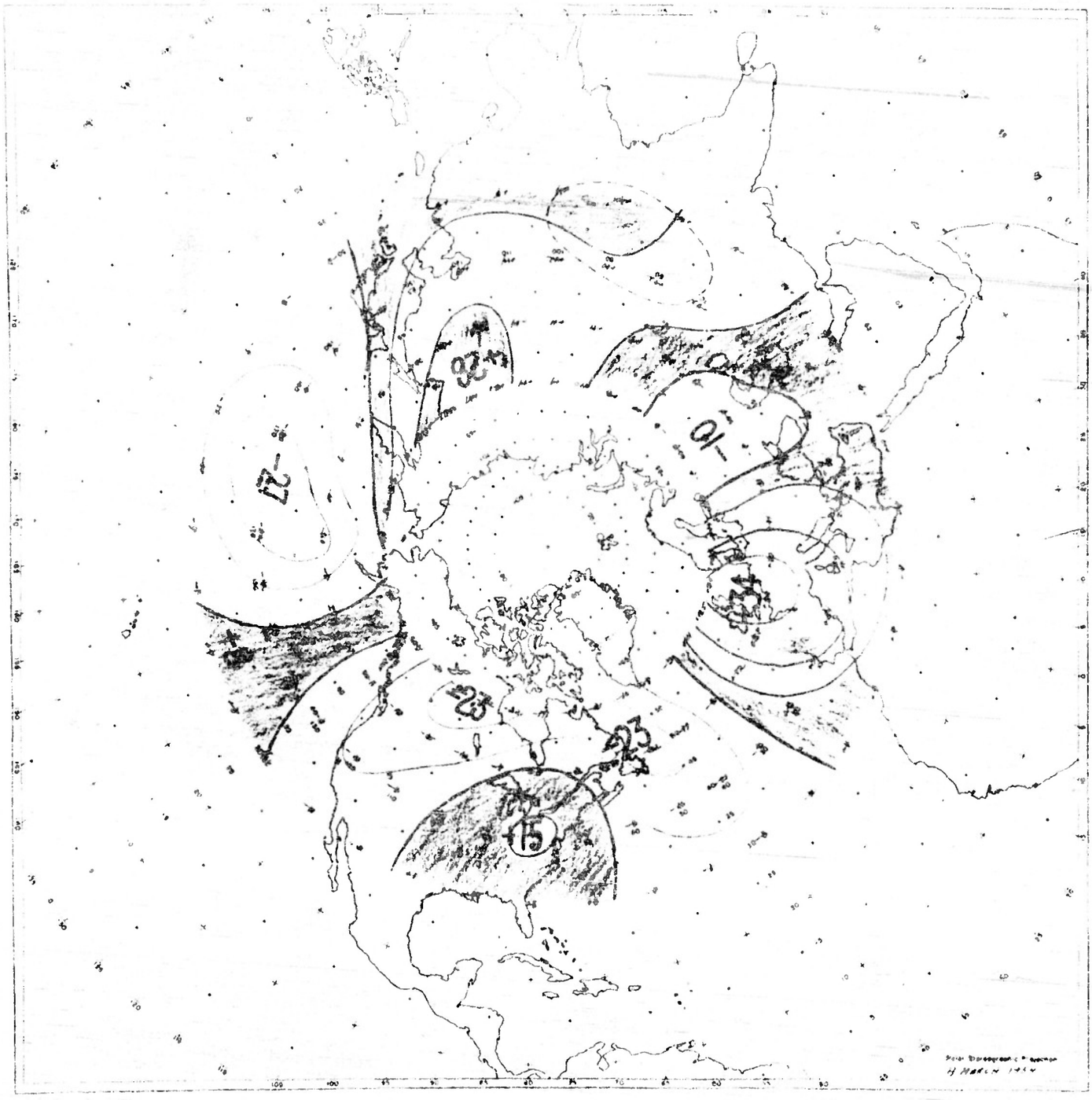
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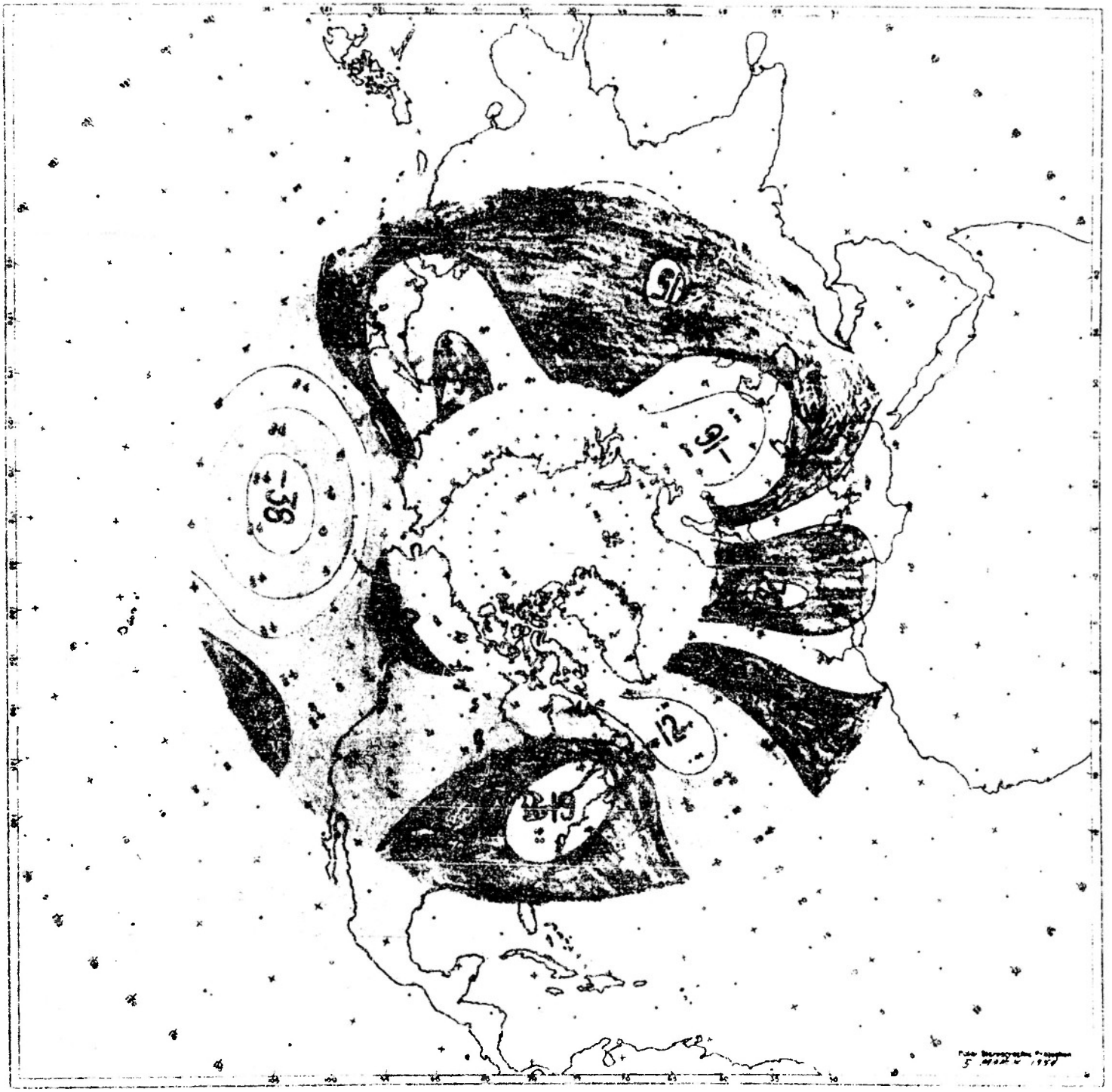
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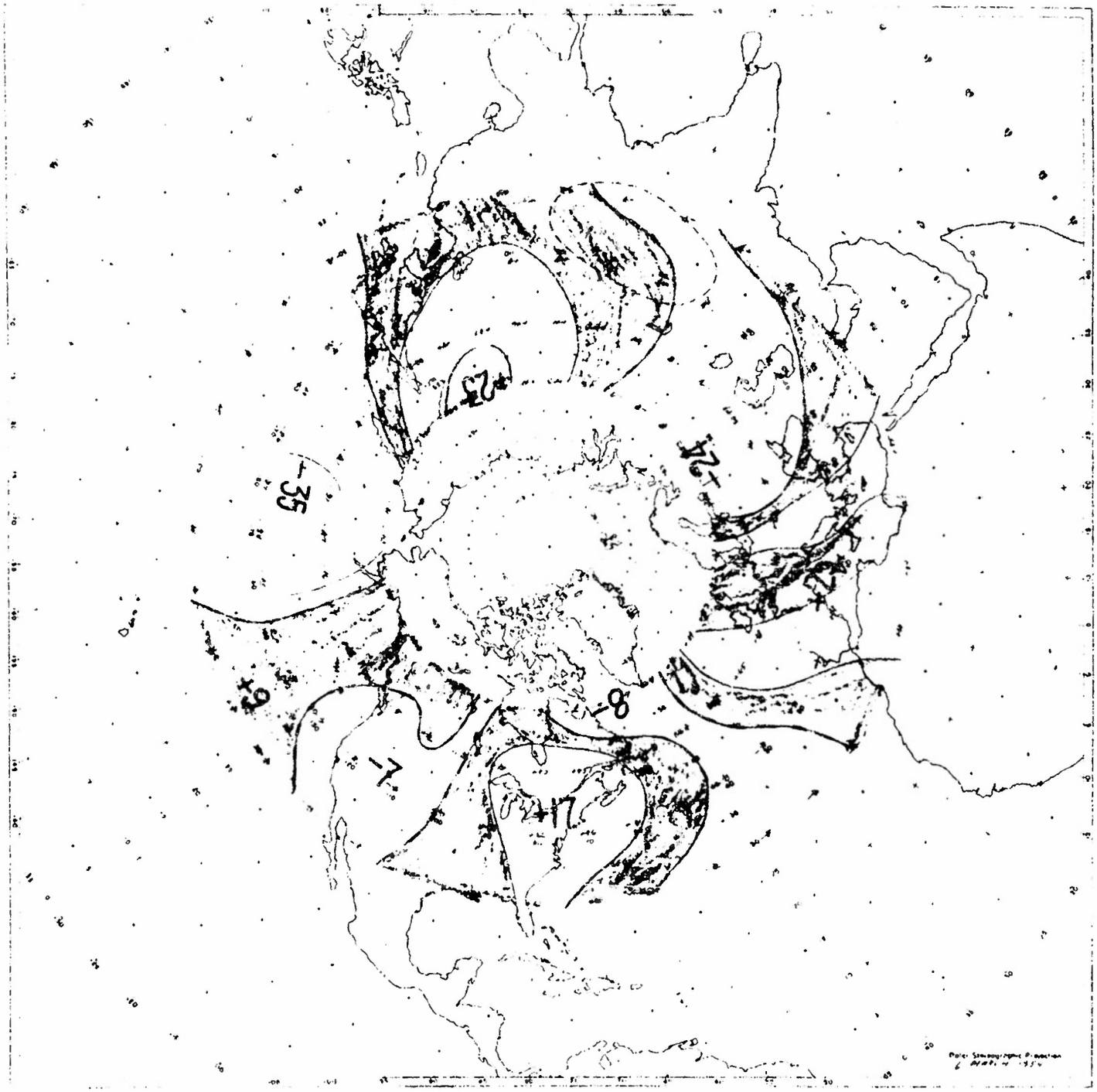
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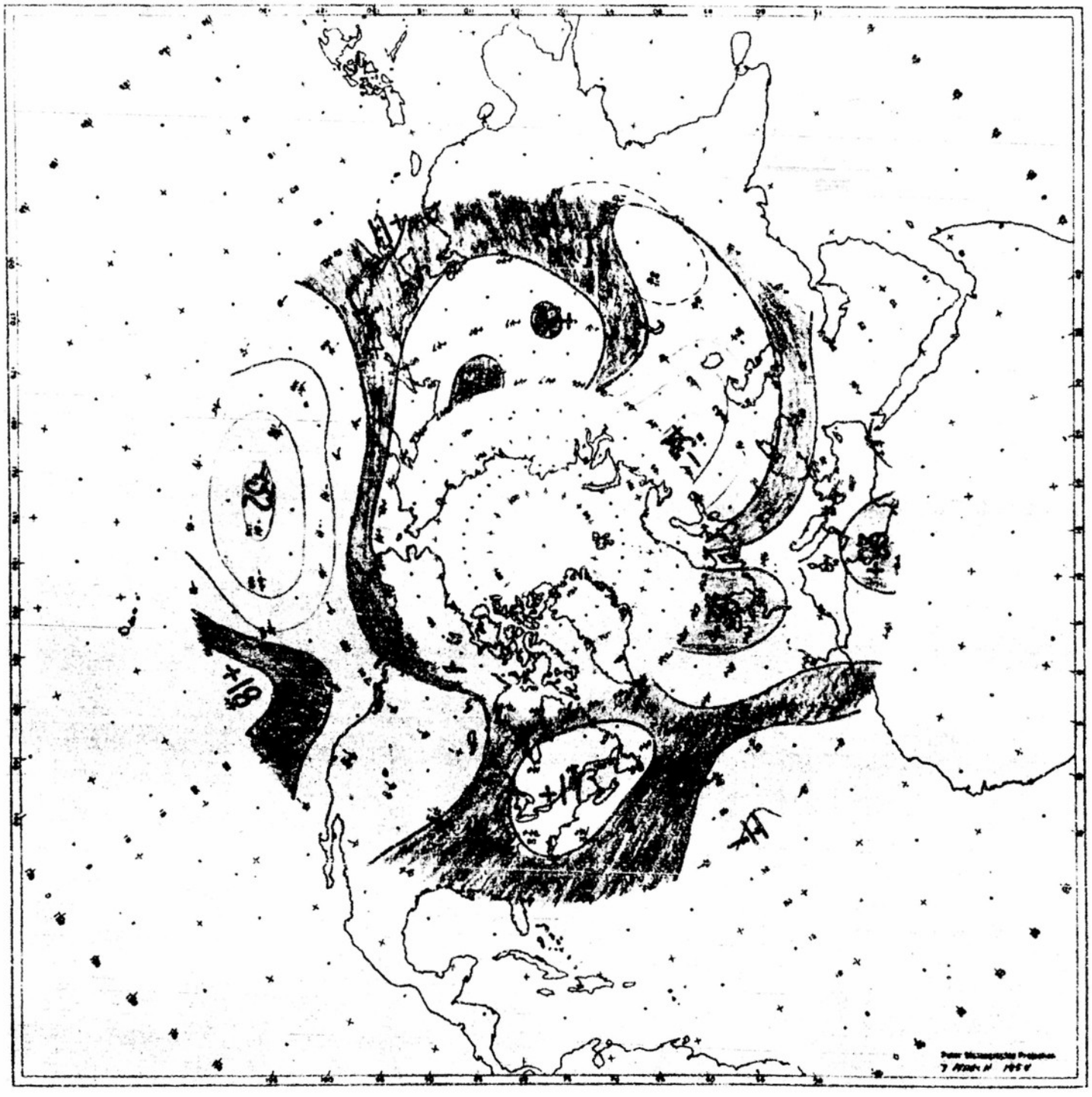
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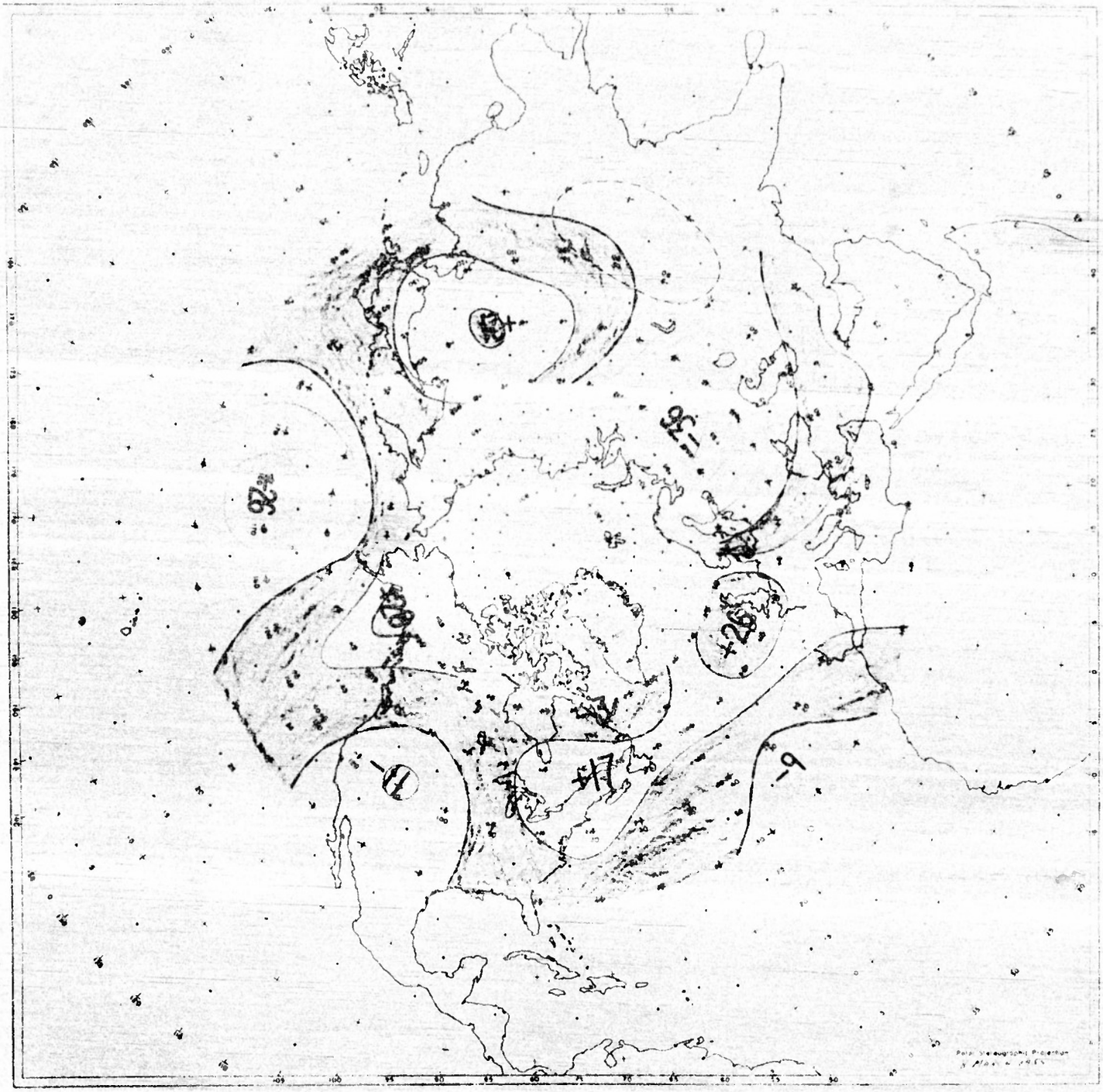
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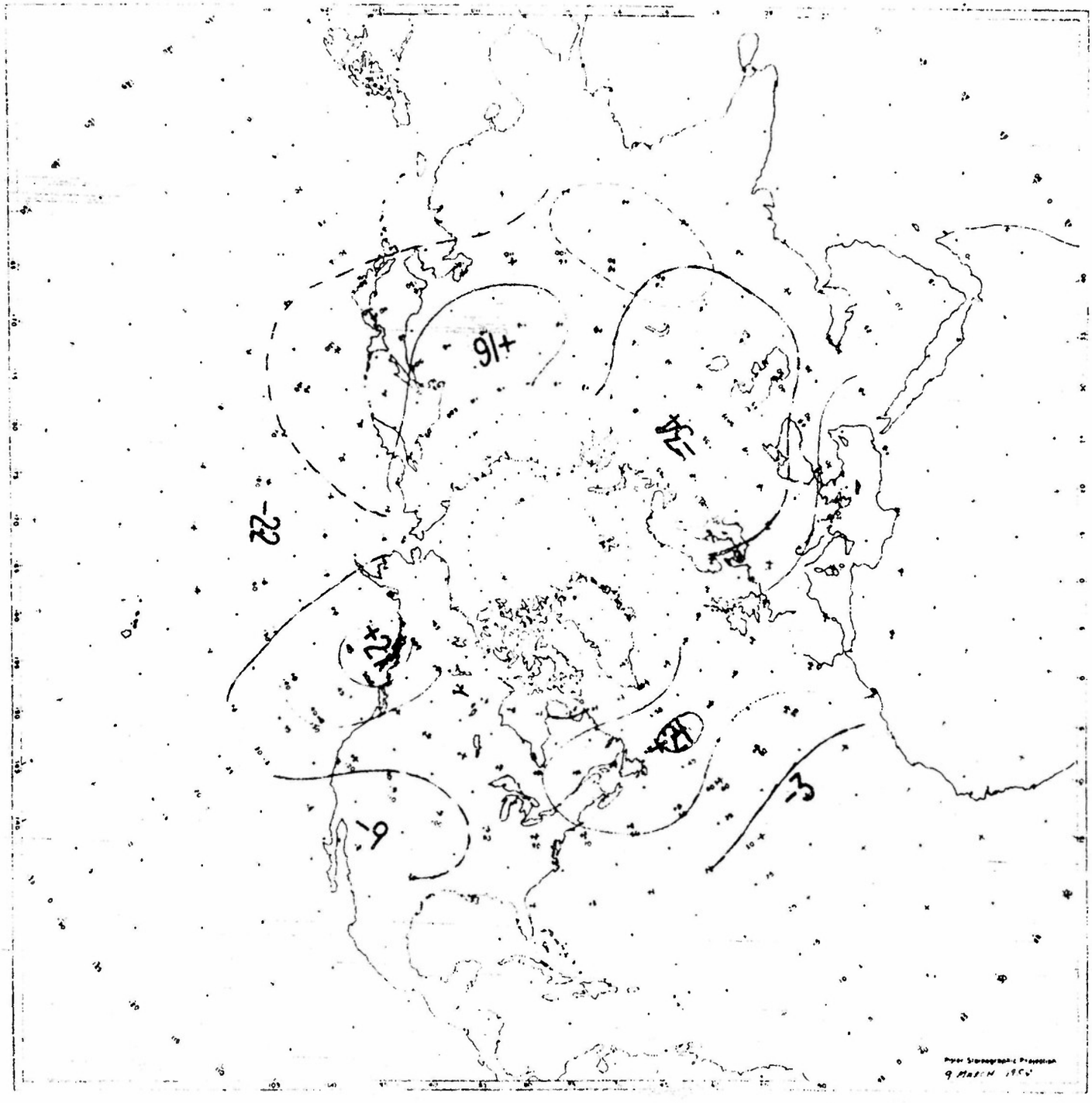
-9
Polar Stereographic Projection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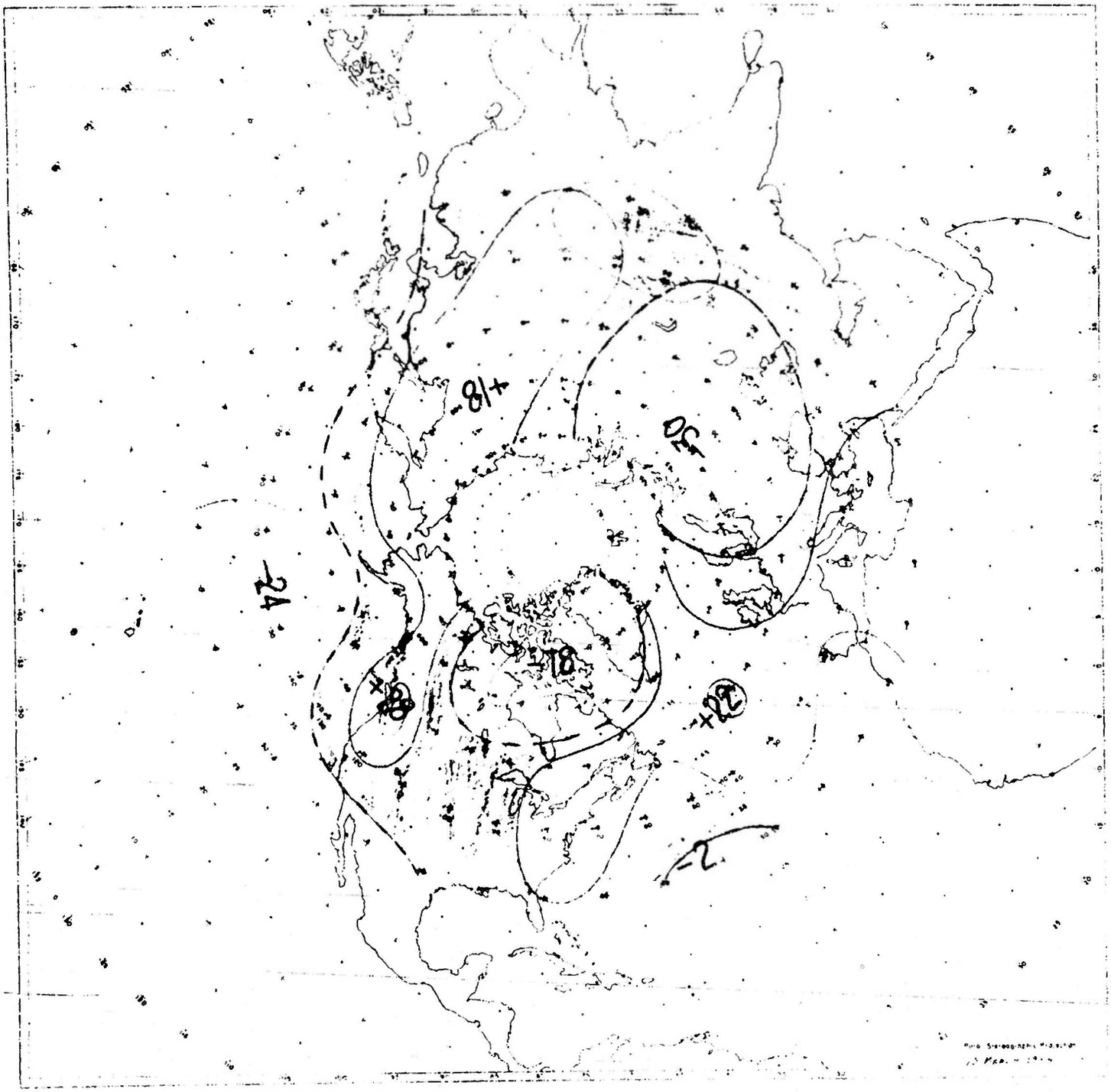
Polar Stereographic Projection
9 MARCH 1956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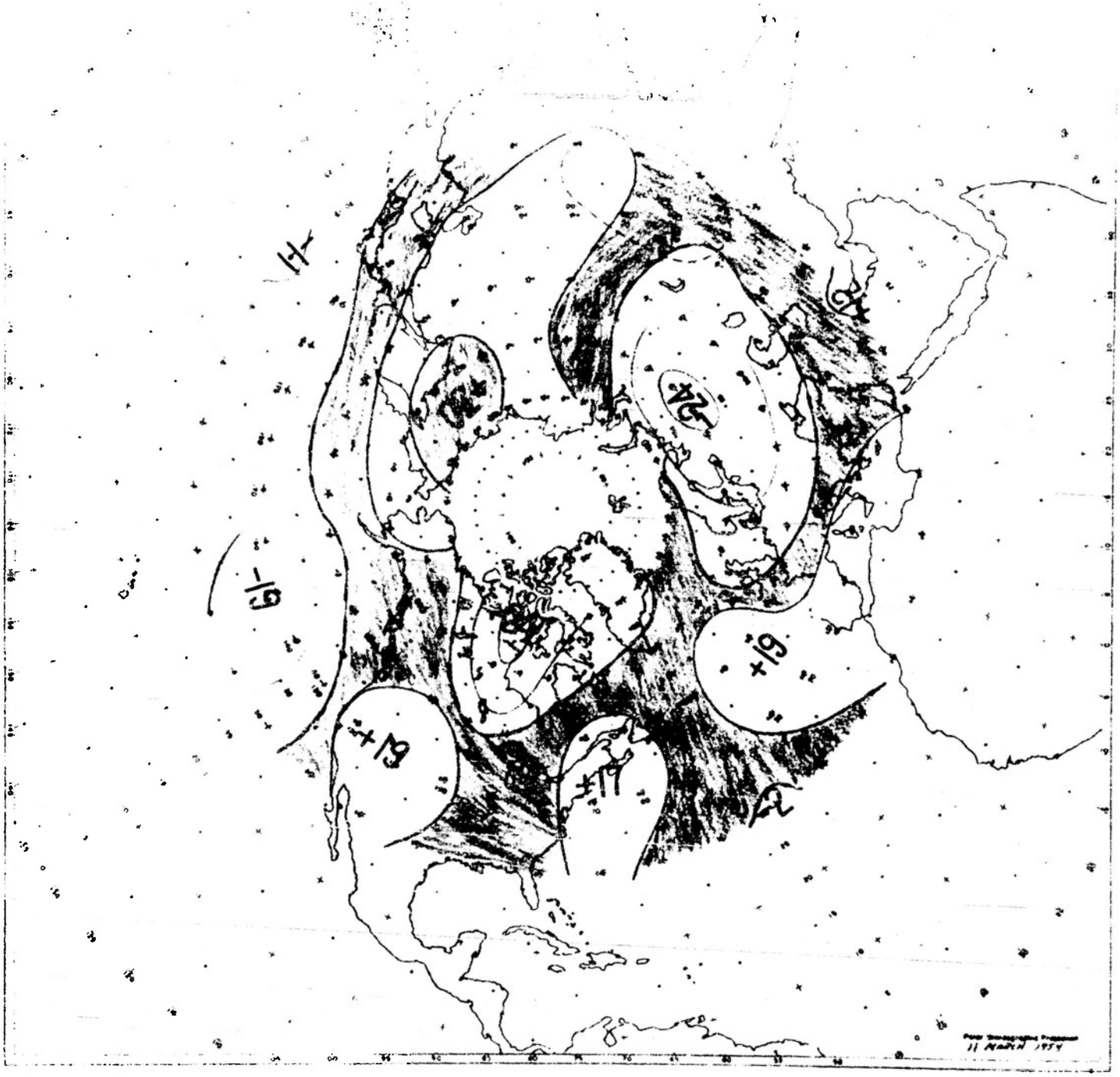
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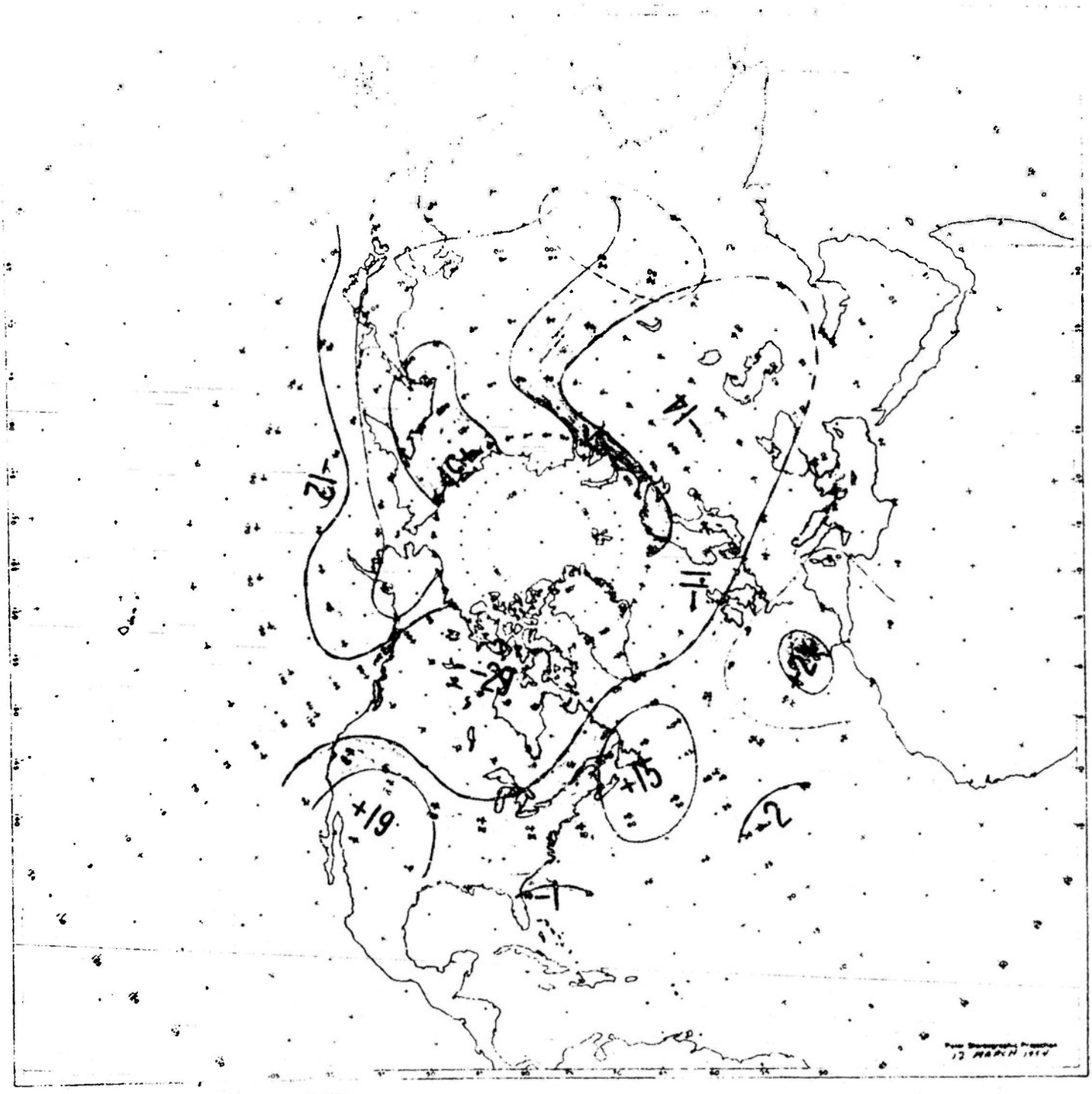
11 MARCH 1954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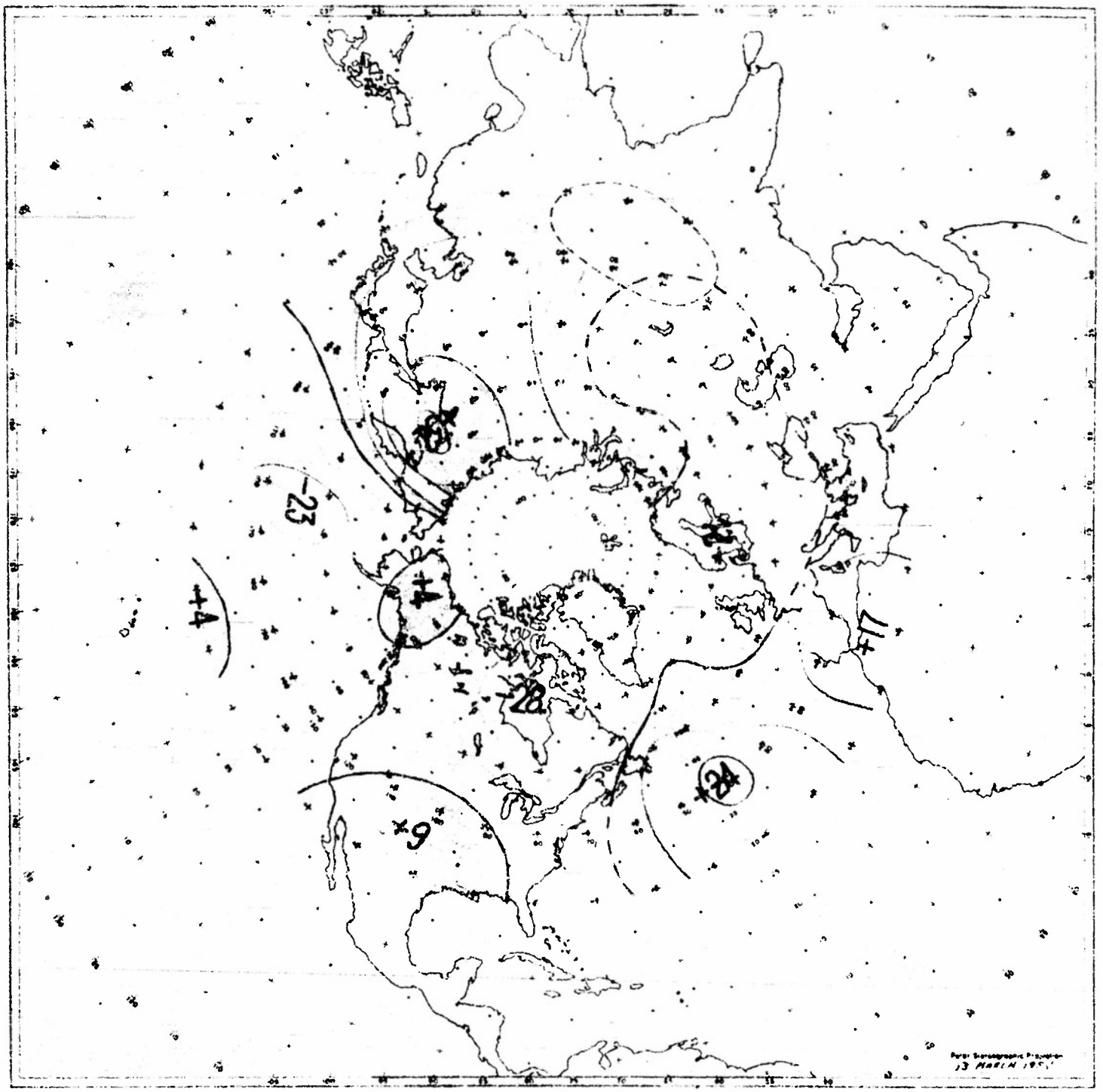
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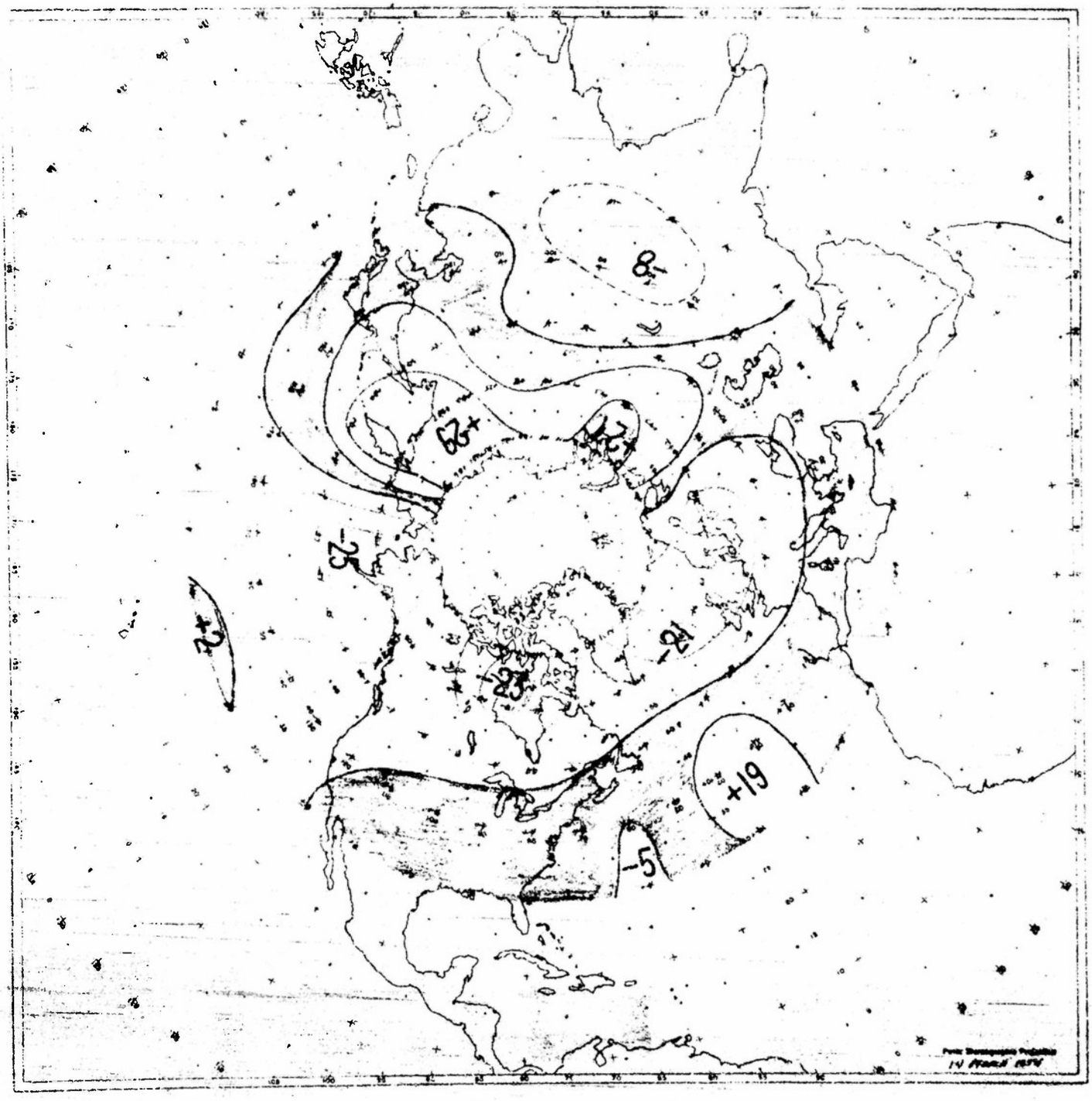
Polar Stereographic Projection
13 MARCH 195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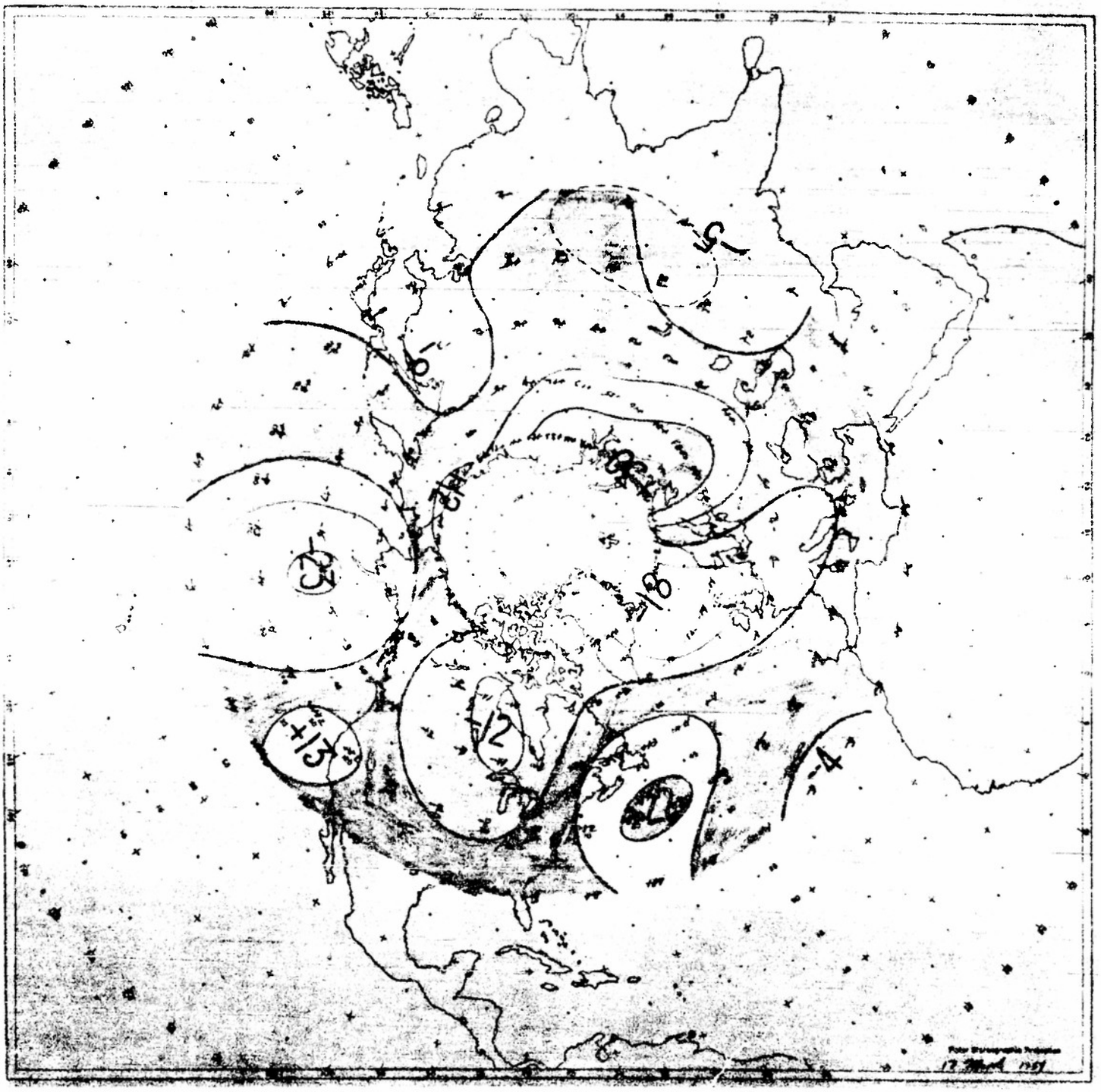

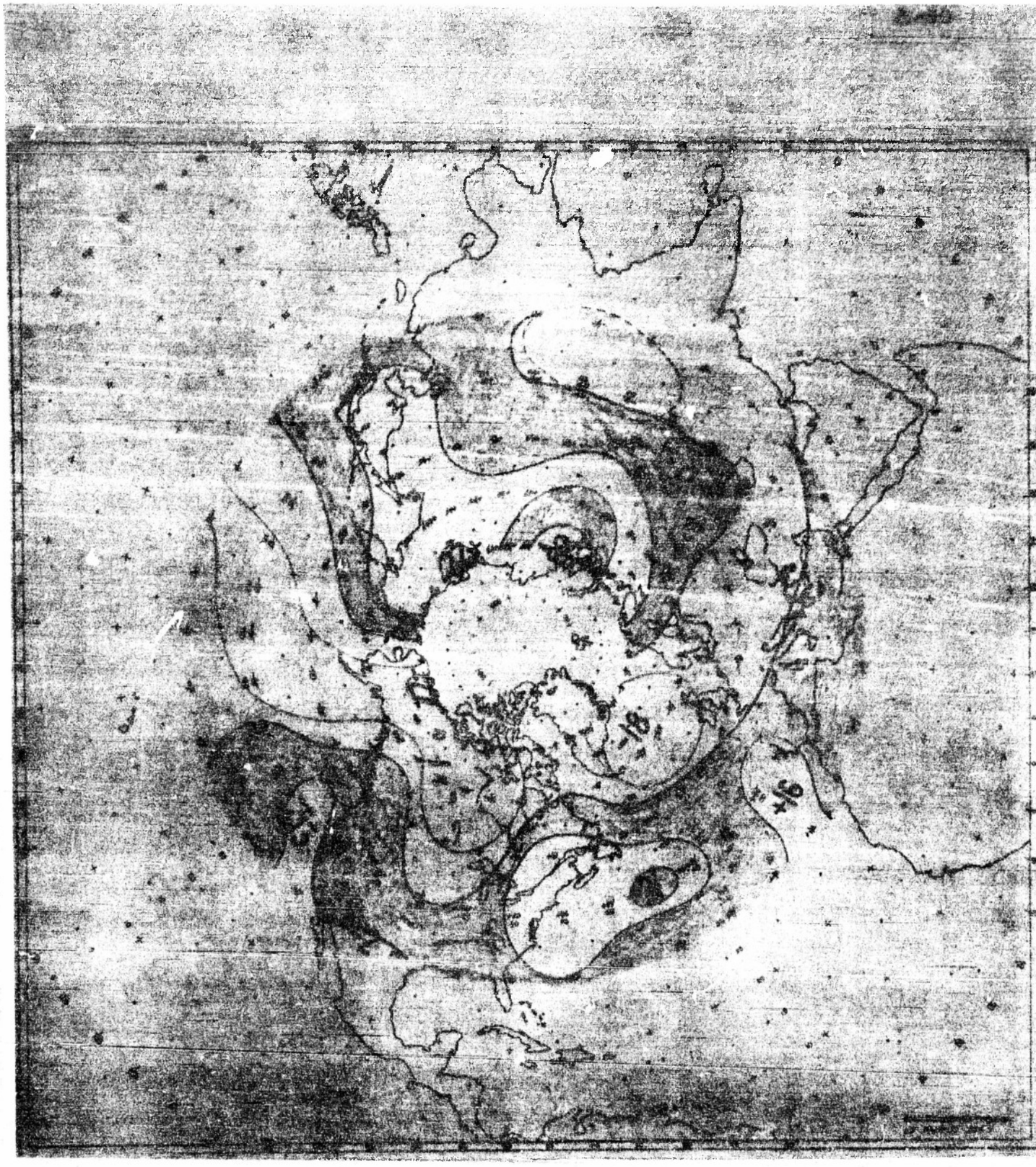

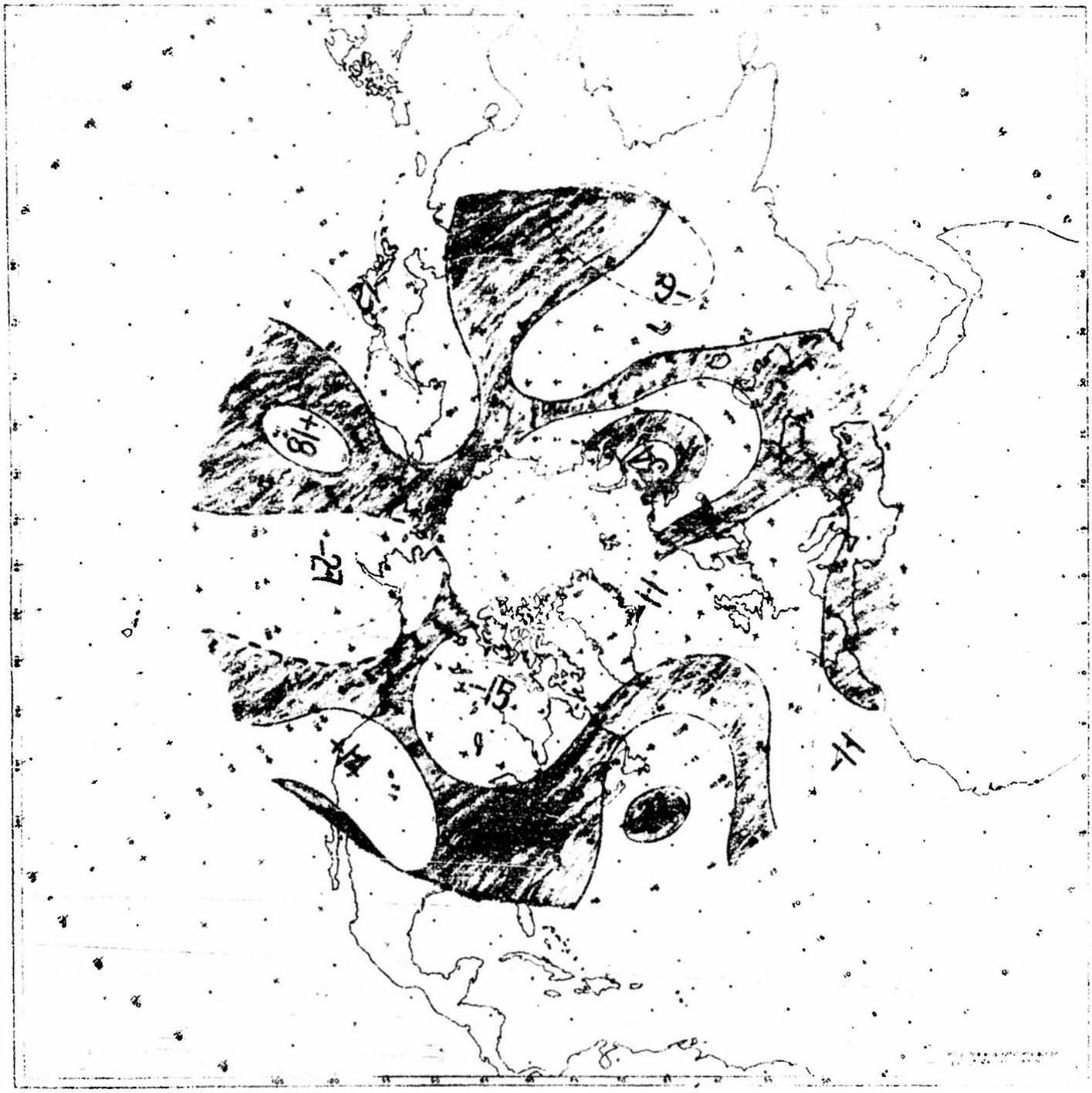
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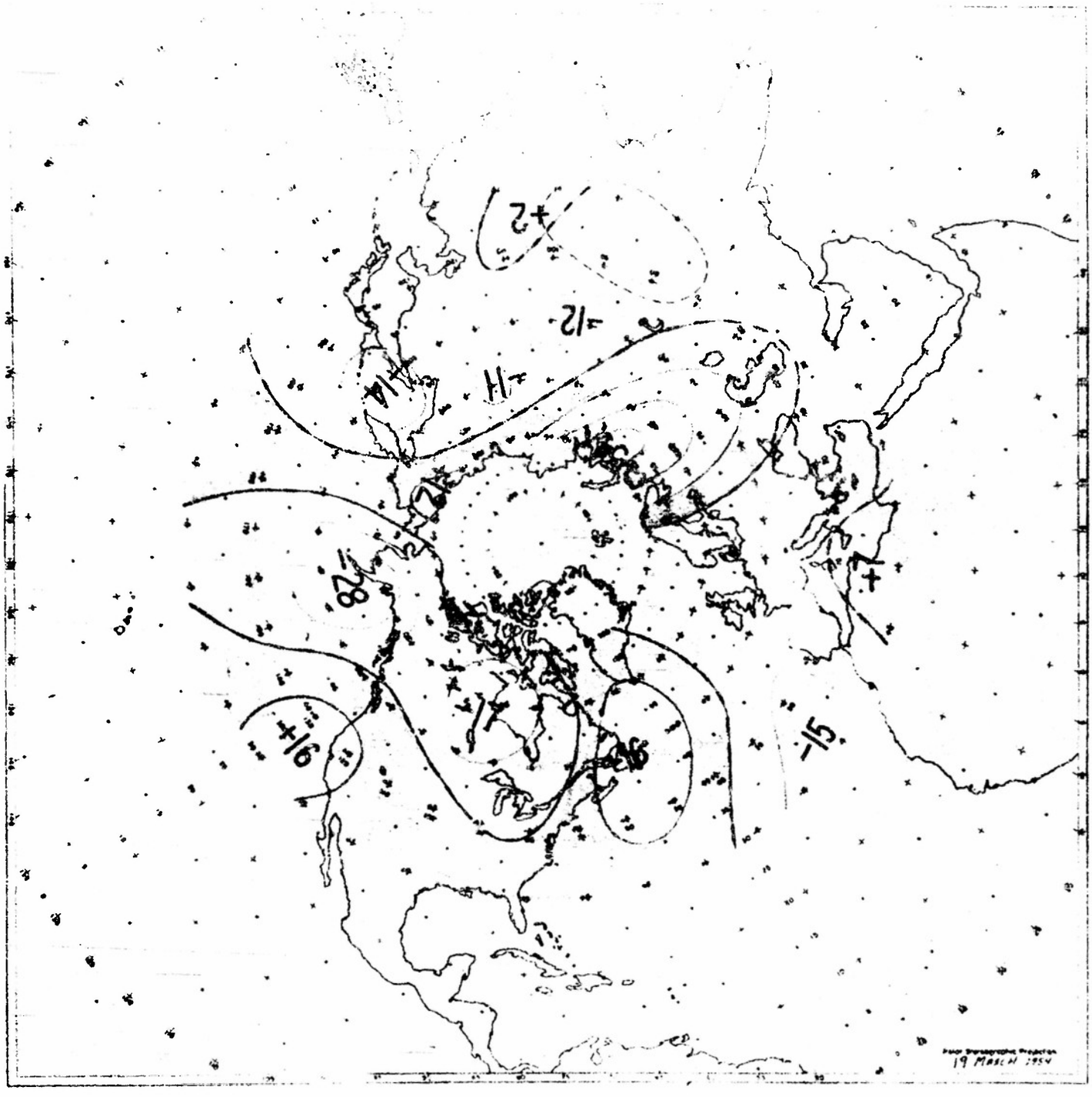
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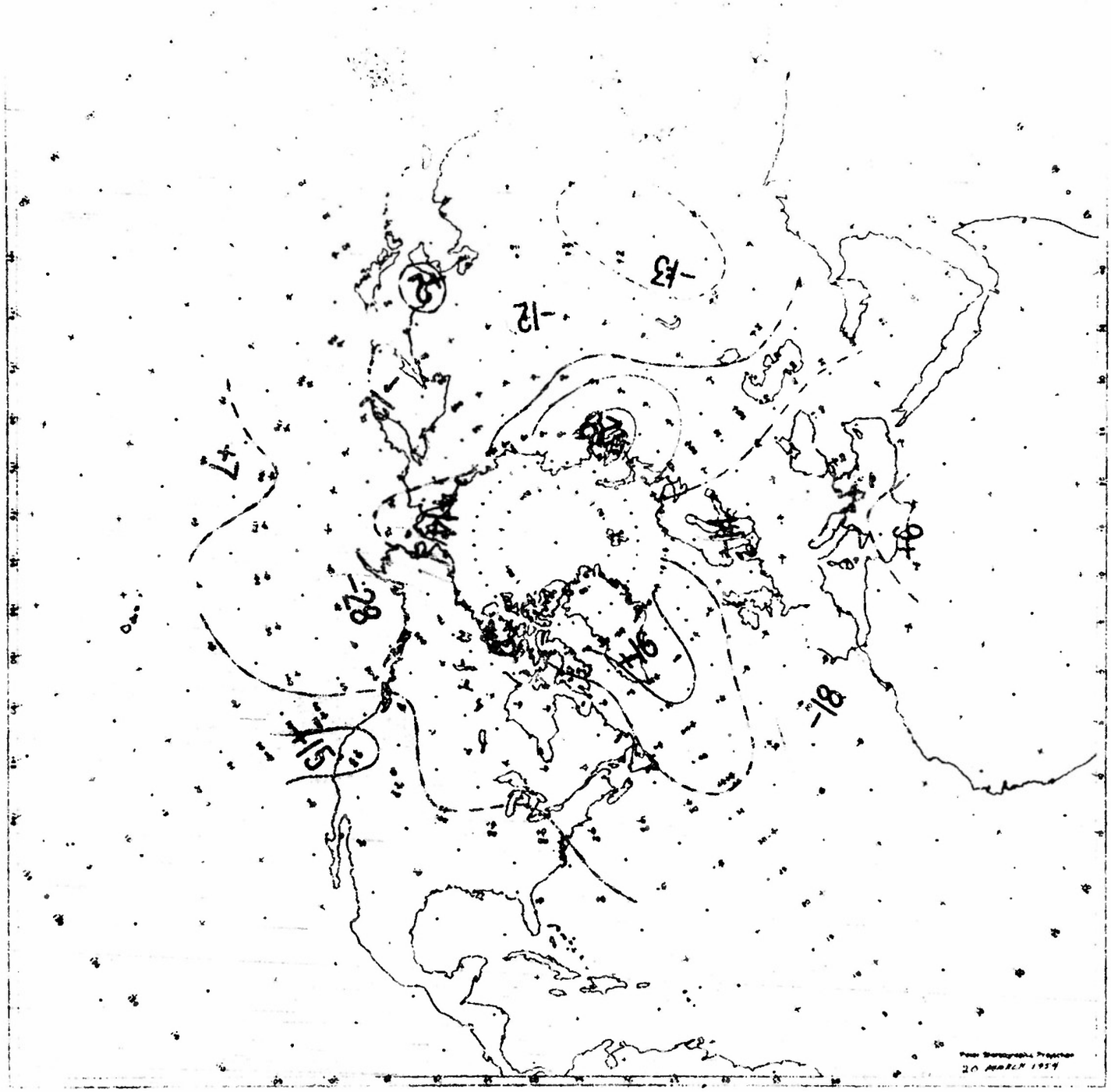
19 MARCH 1954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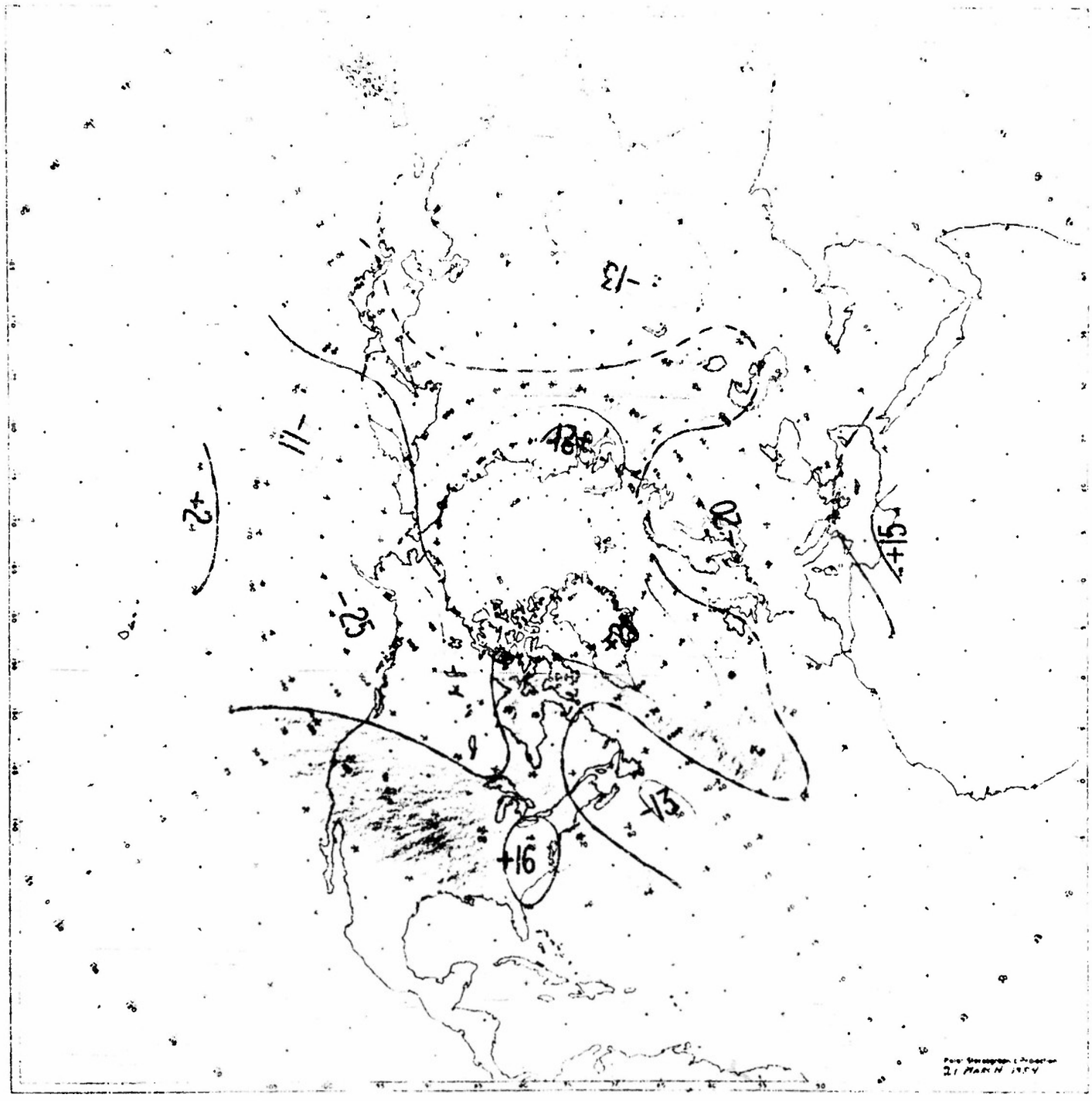
20 MARCH 1954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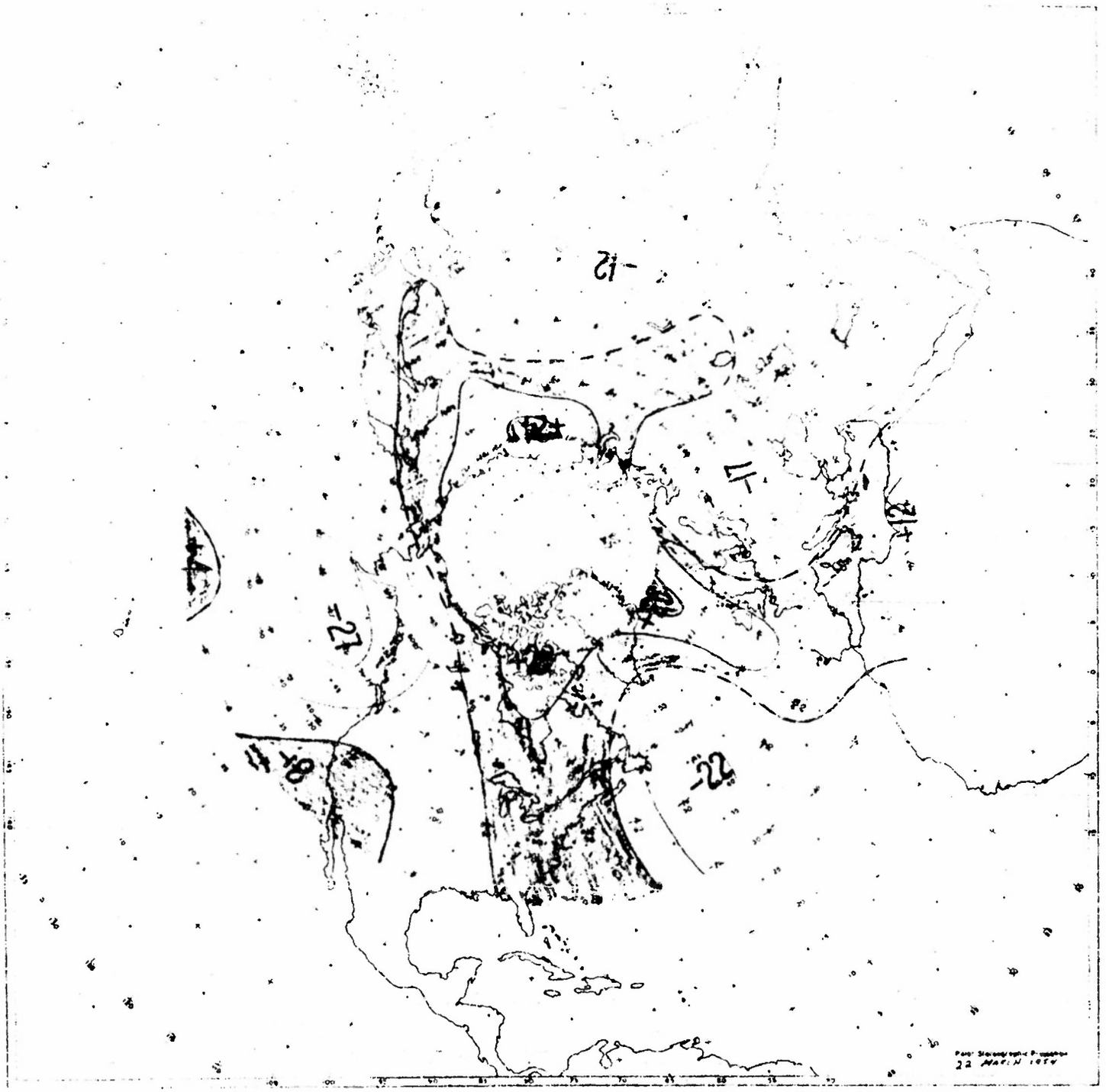
21 MARCH 1954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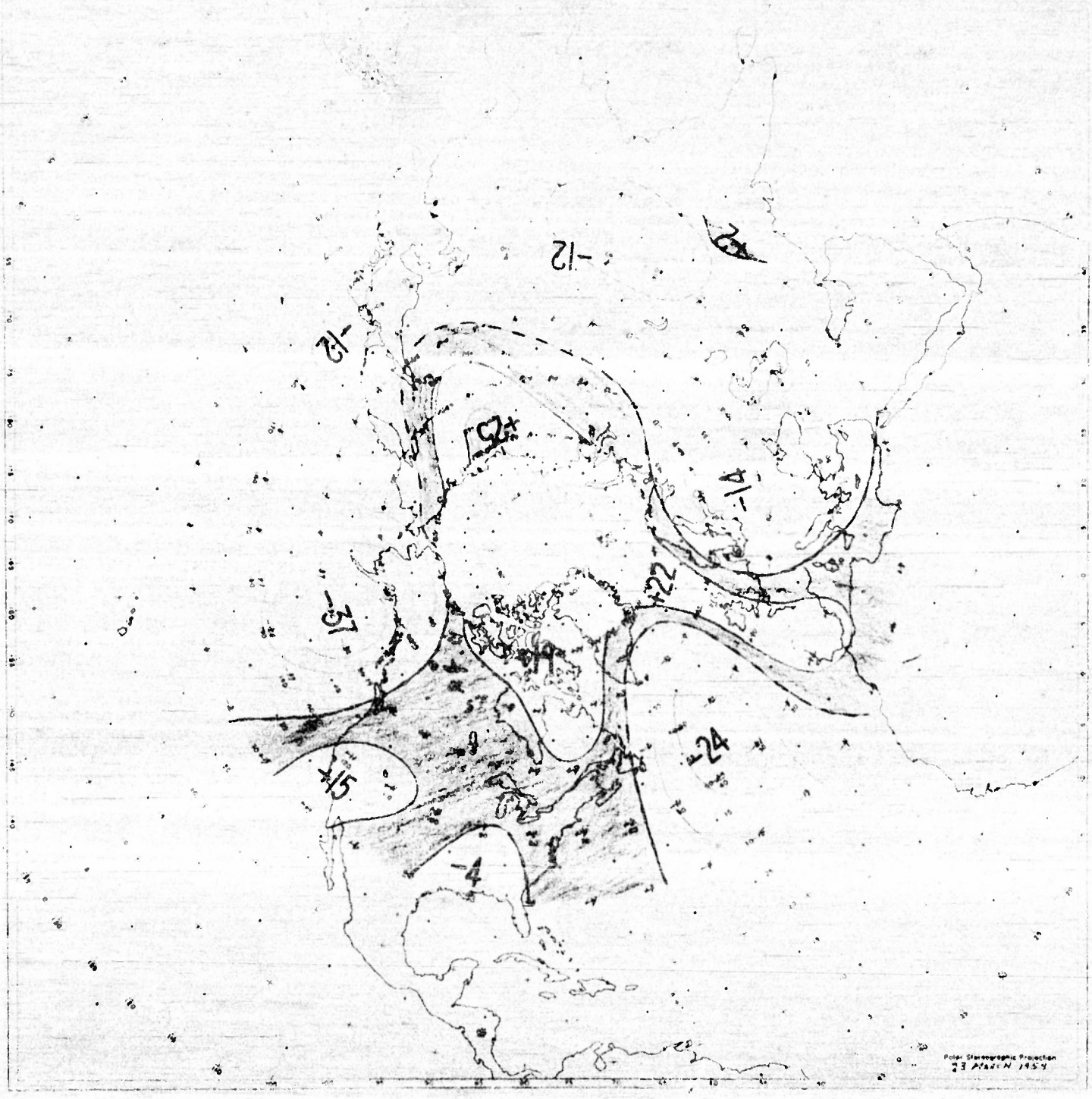
22 MARCH 1954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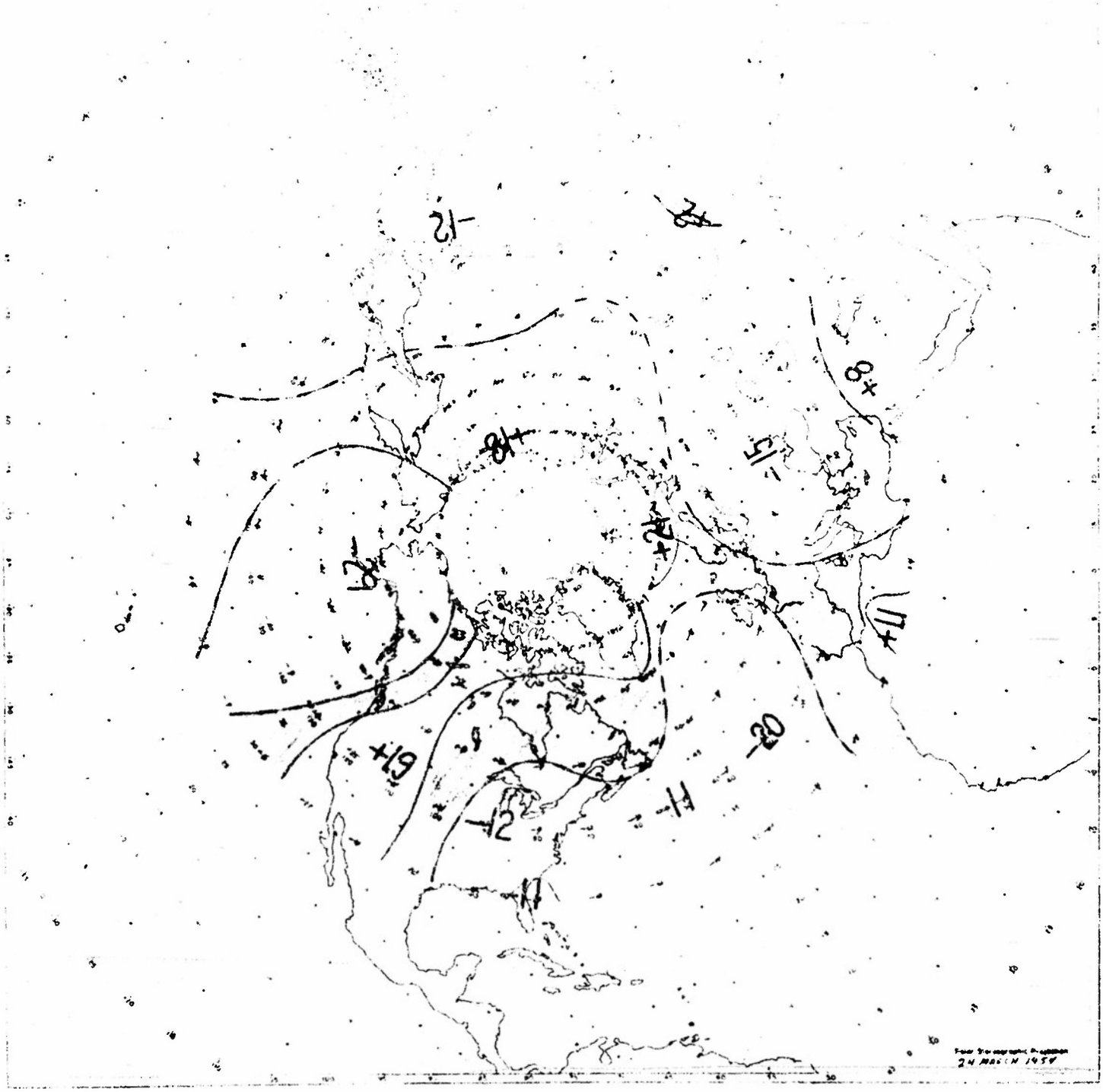
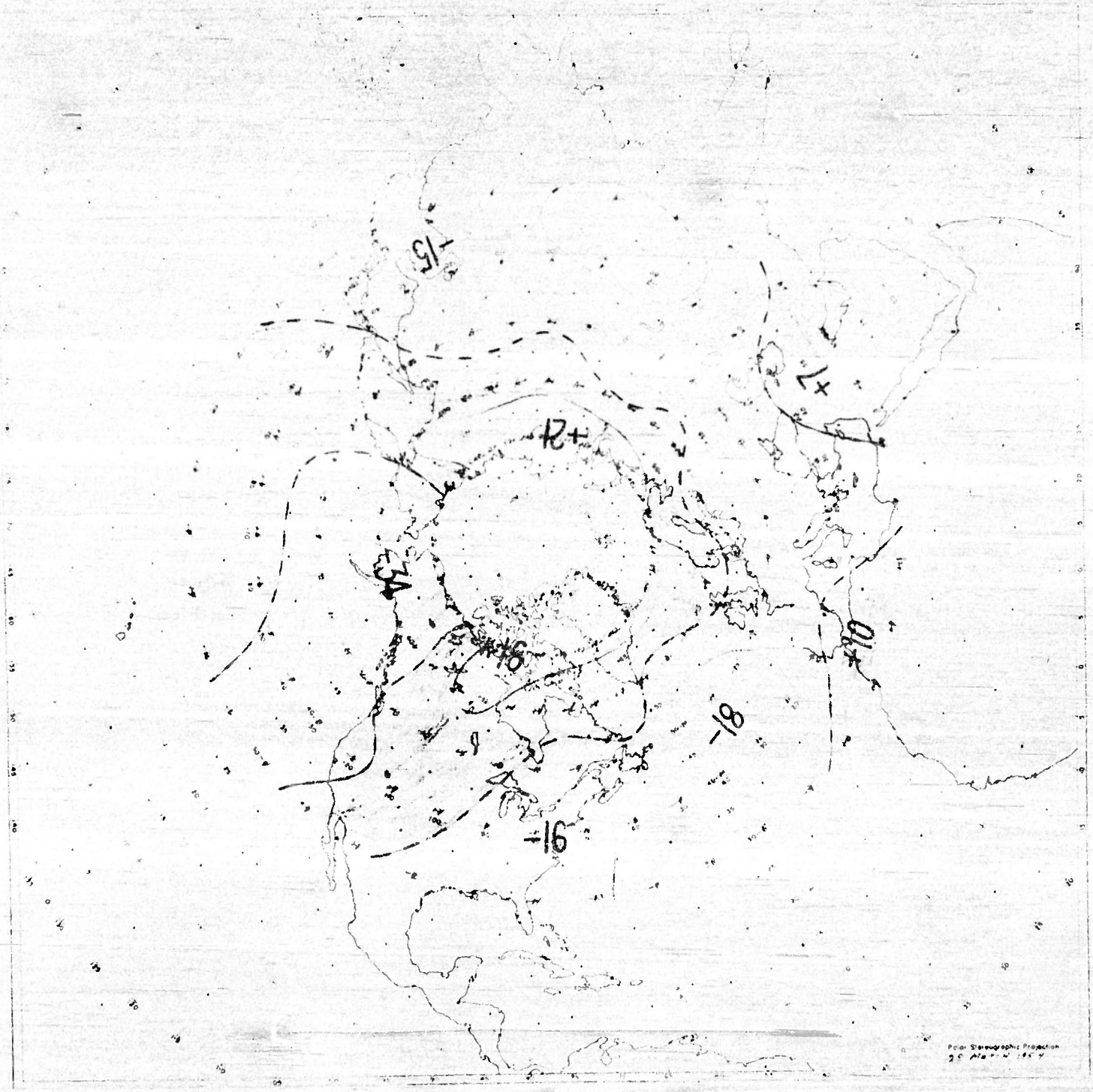
Polar Stereographic Projection
23 MARCH 1954

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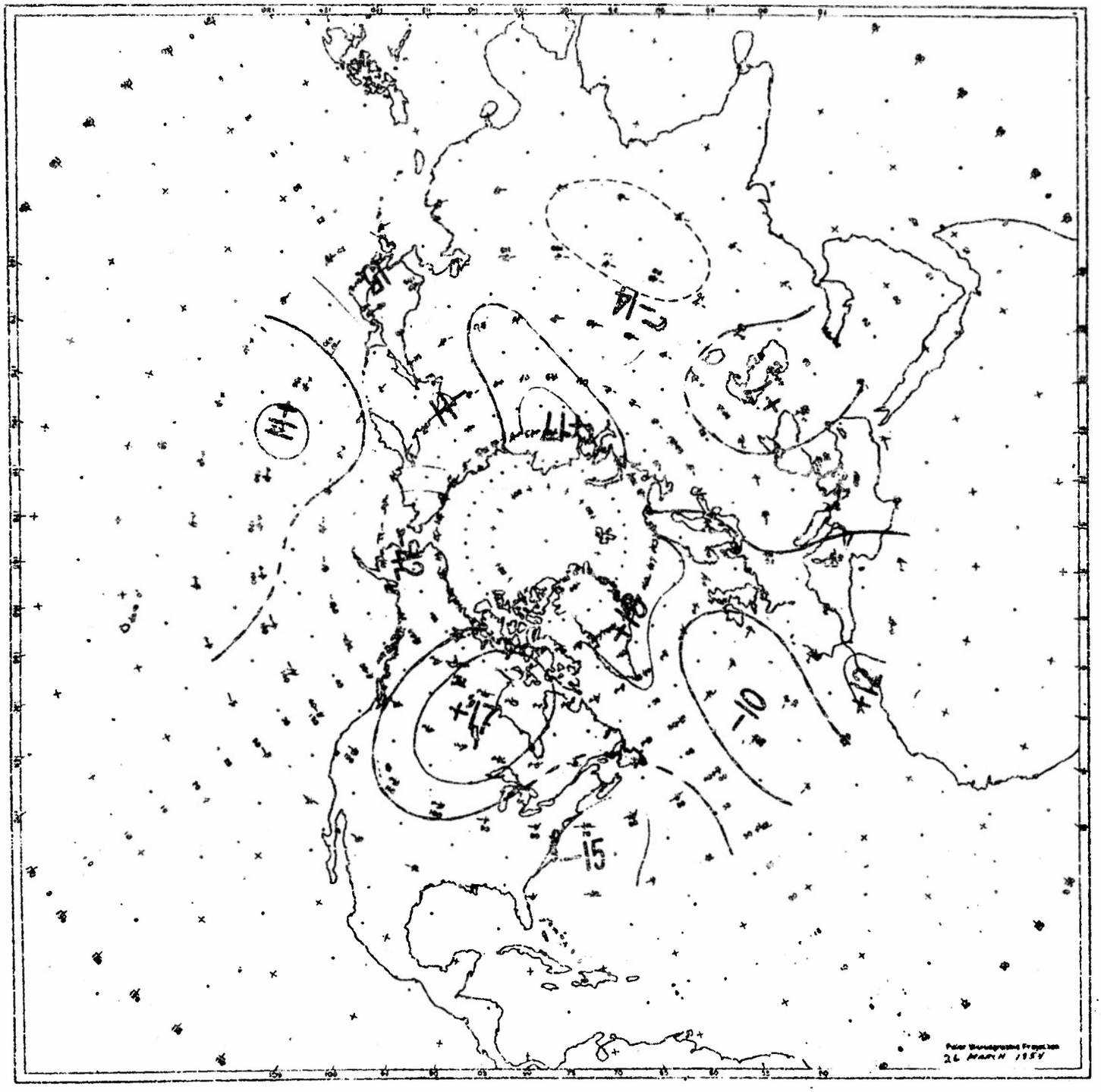
-16
Polar Stereographic Projection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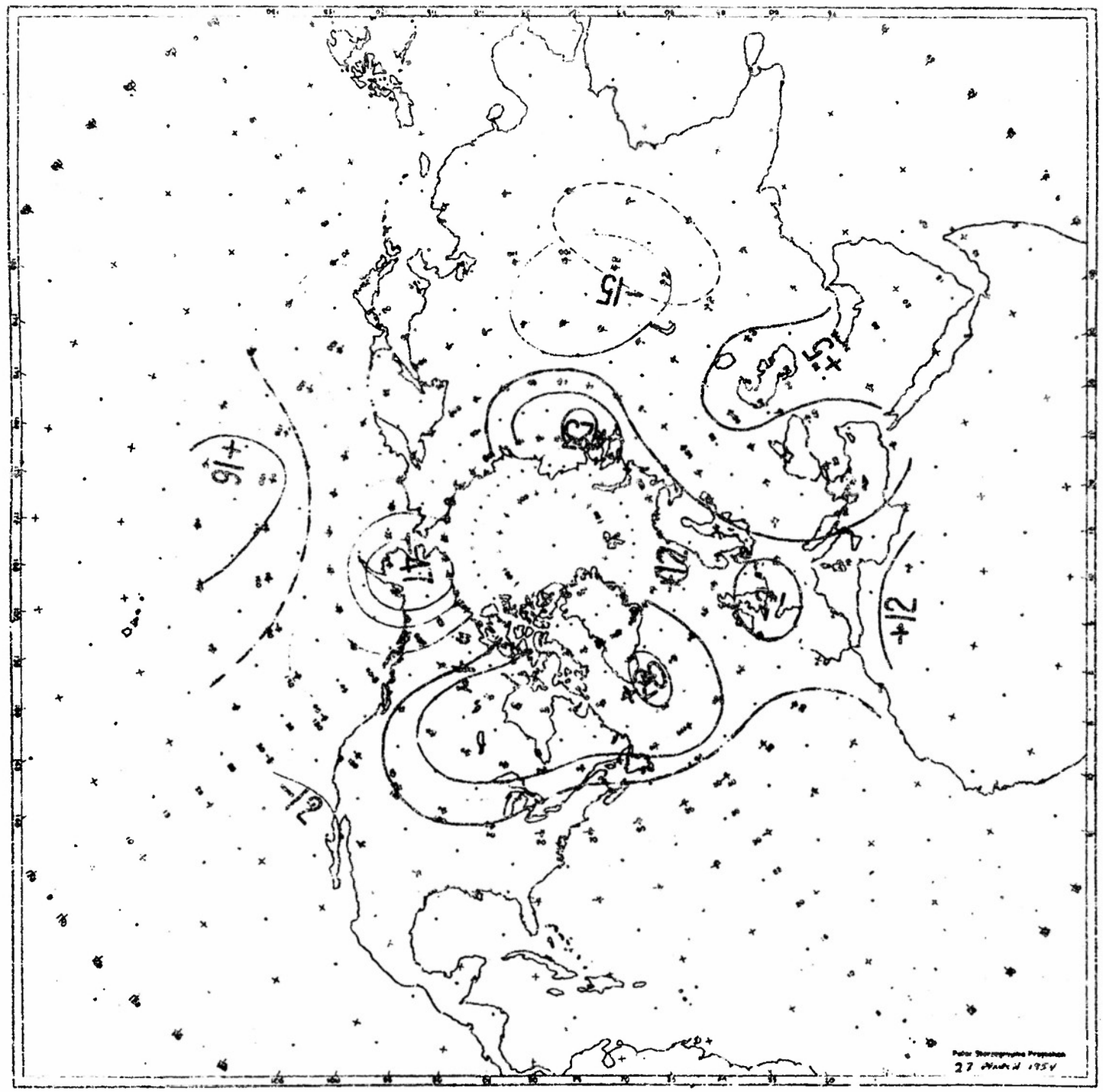
26 MARCH 1954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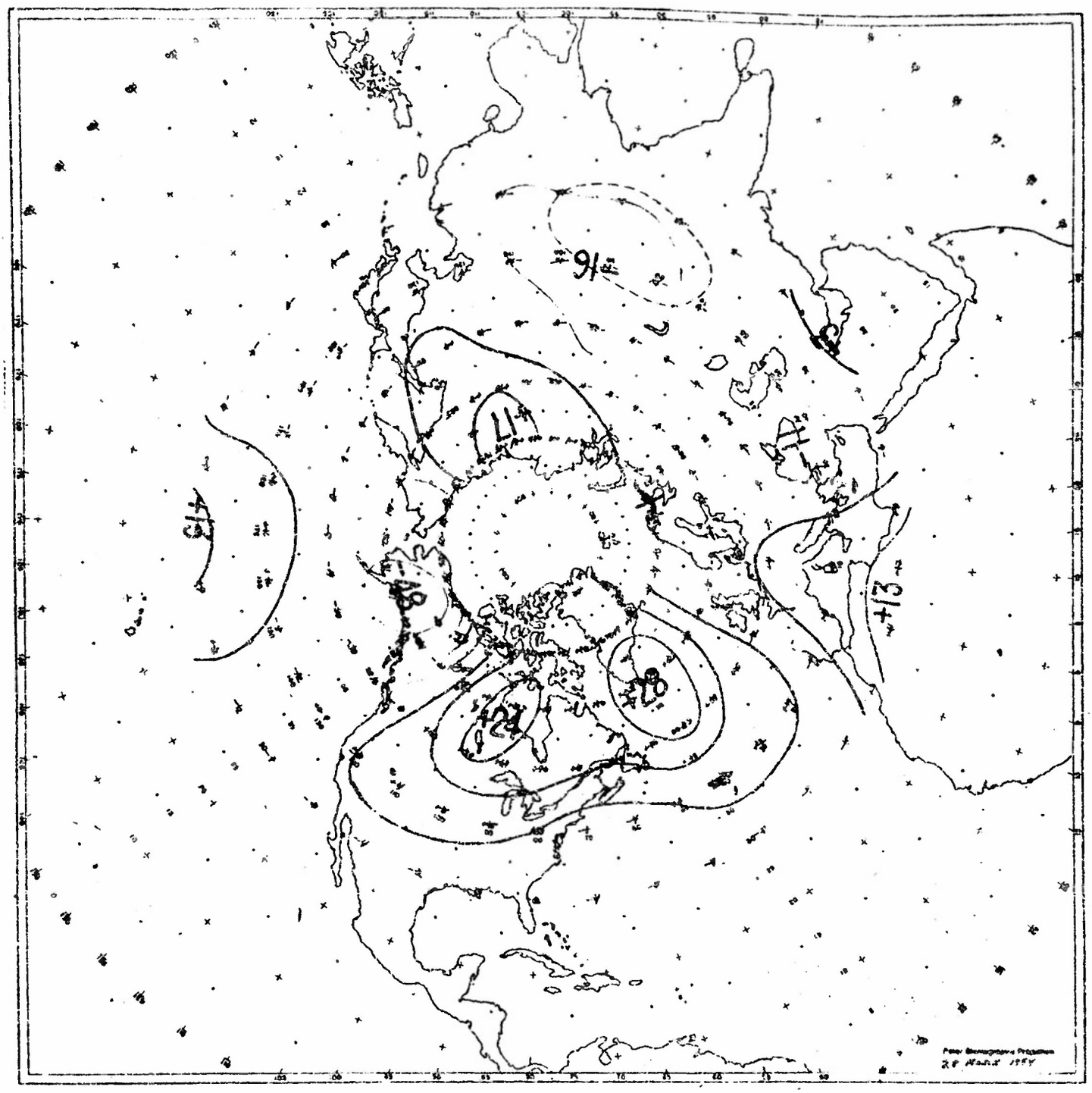
Polar Stereographic Projection
27 March 1954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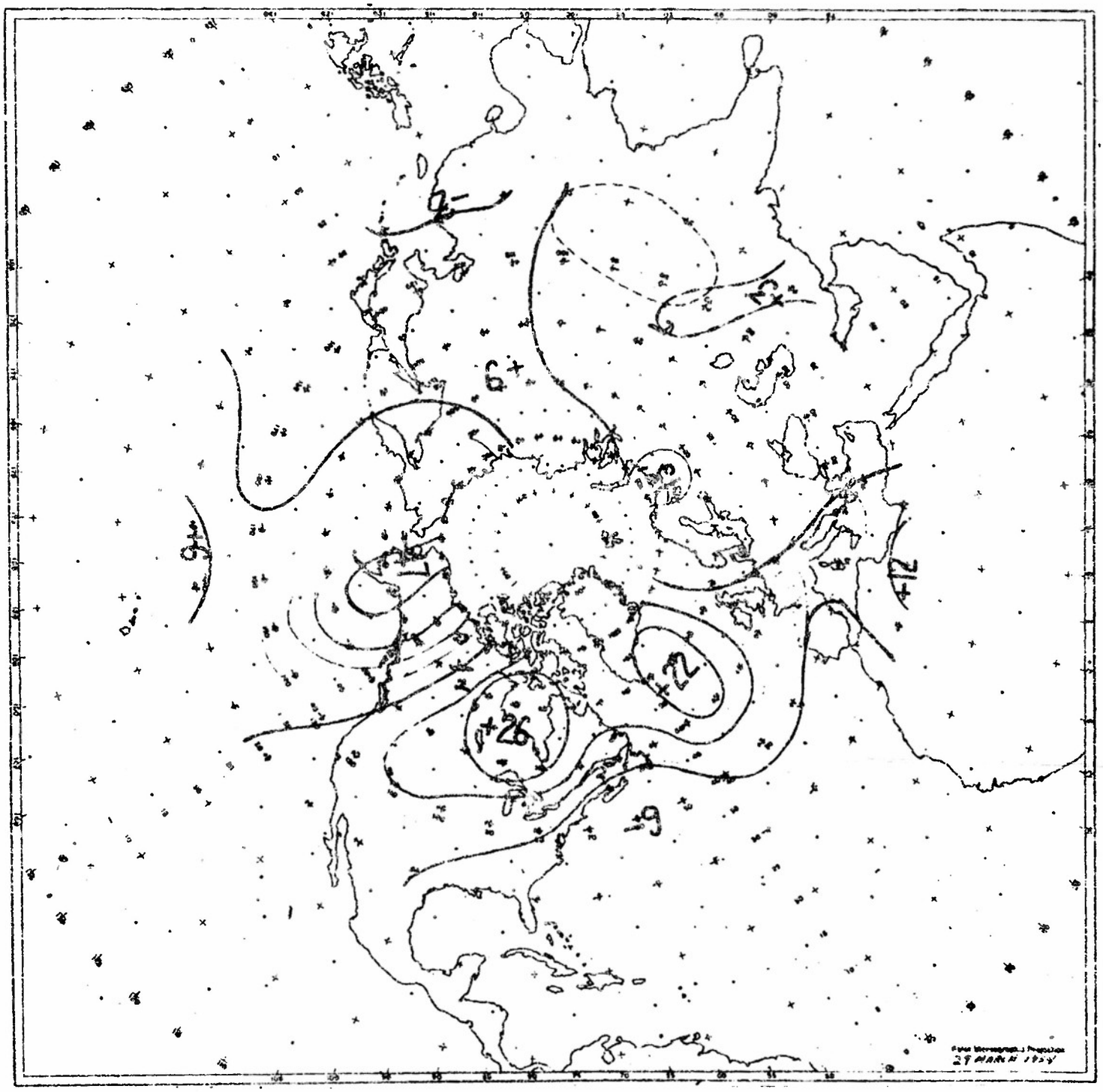
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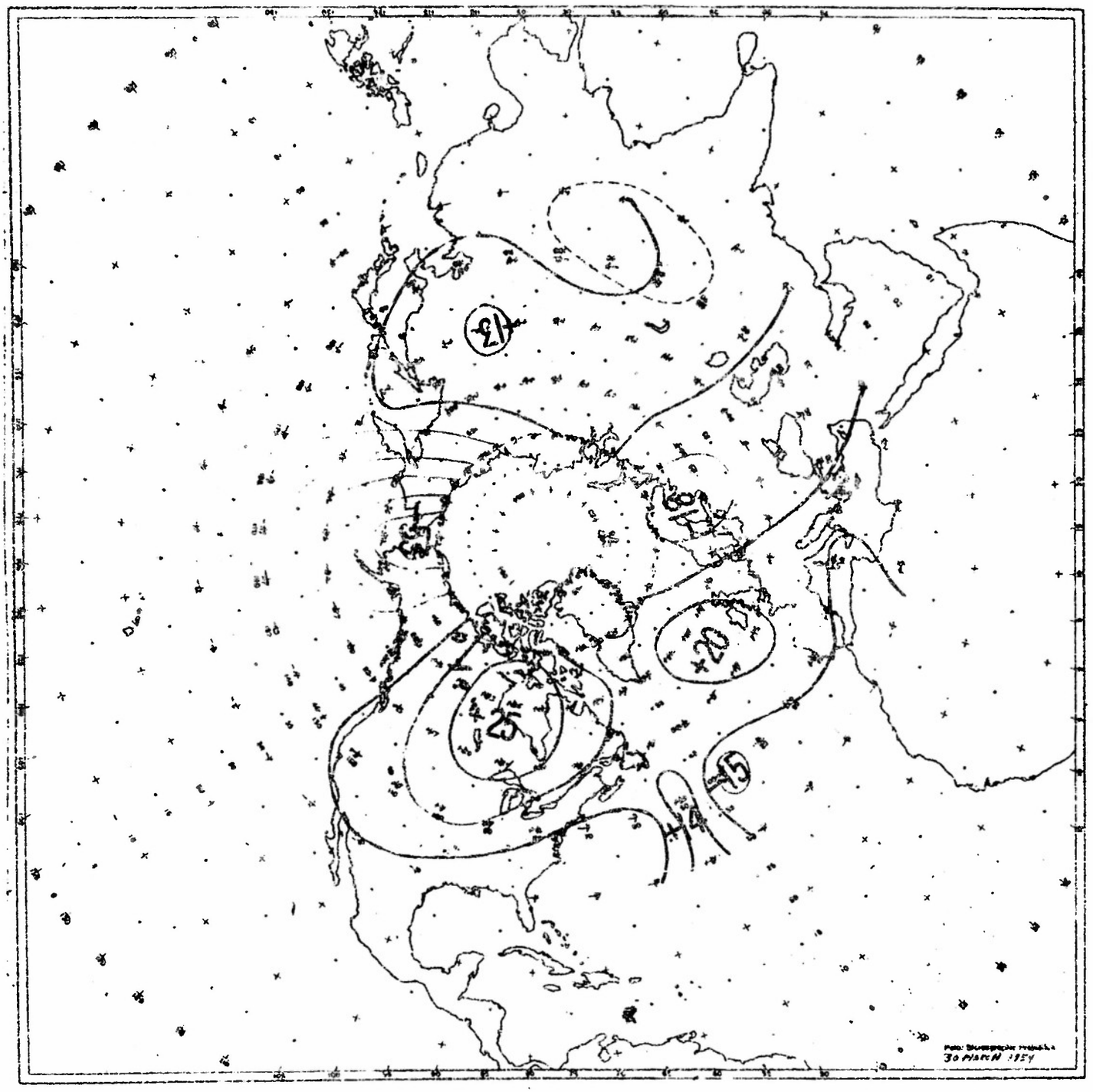
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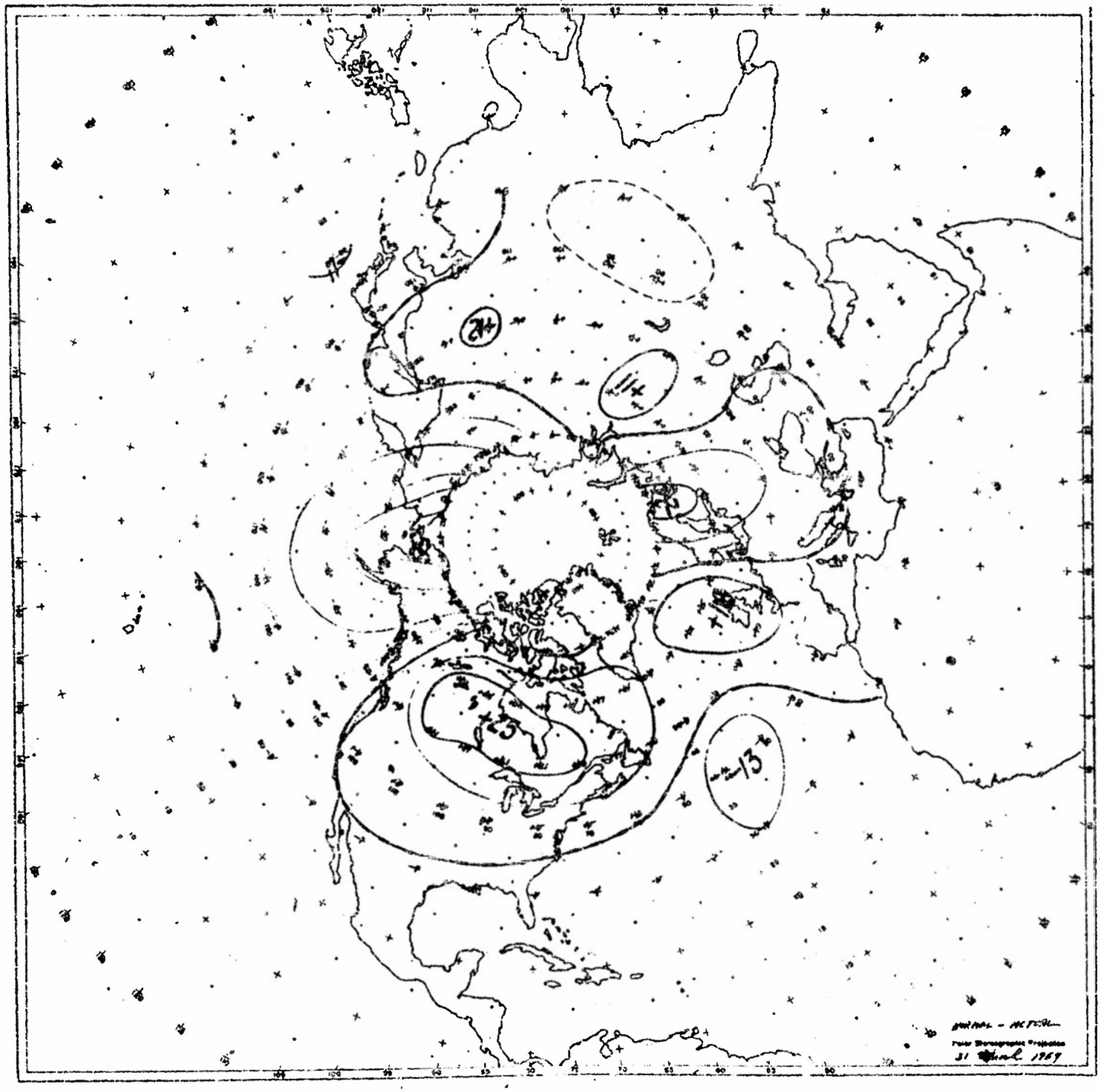
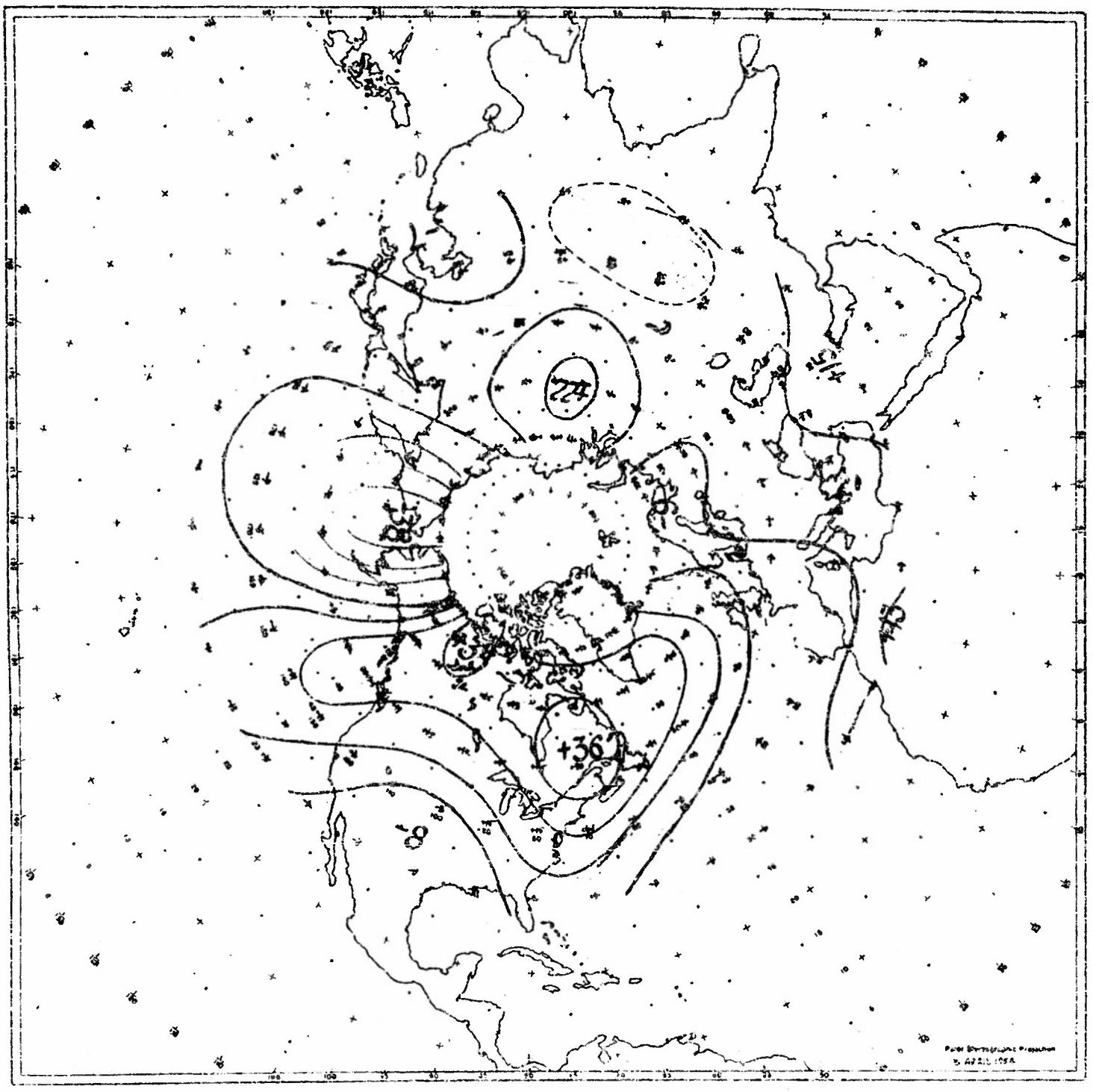
30 MARCH 1954


Polar Stereographic Projection
31 March 1969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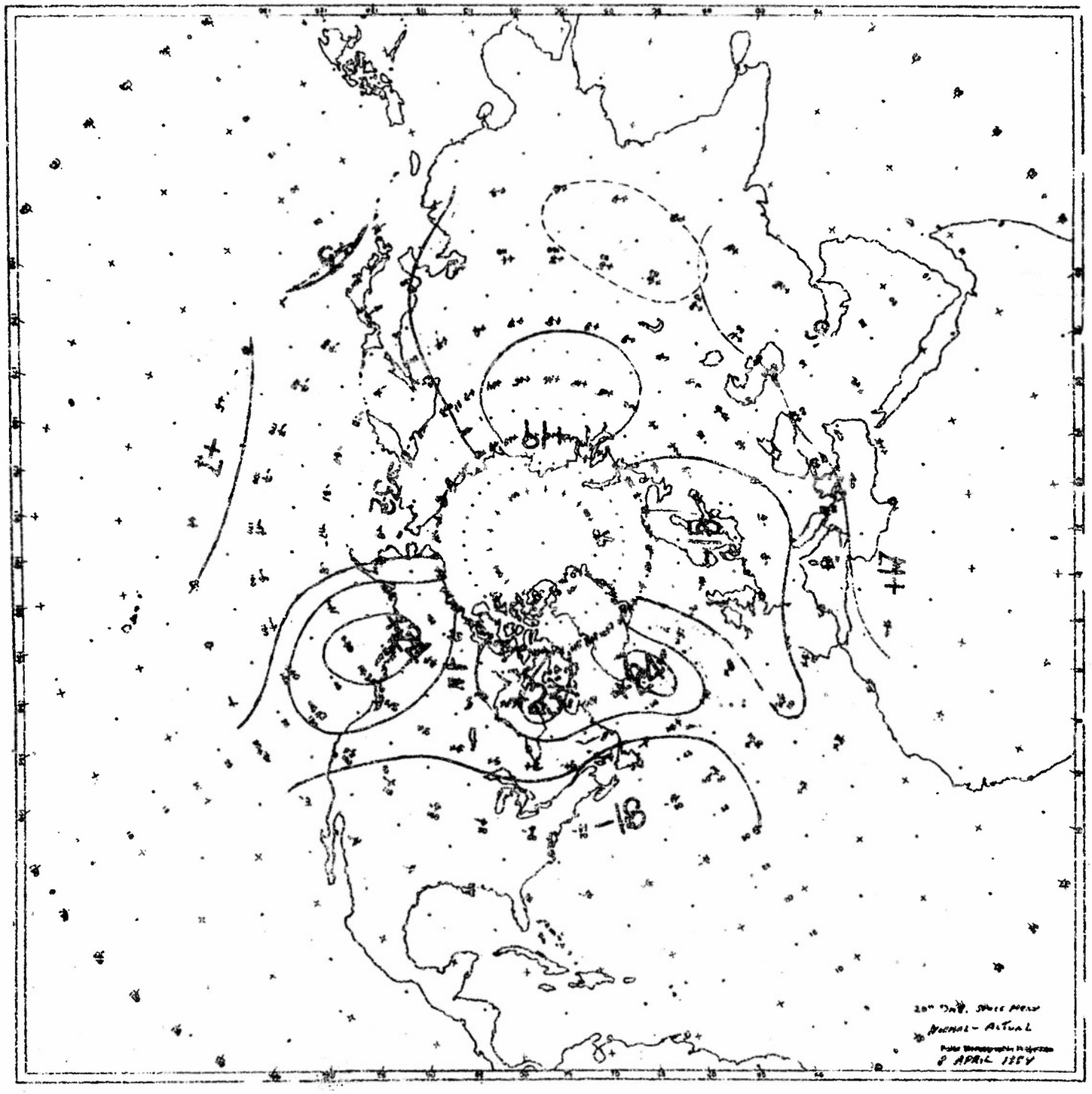
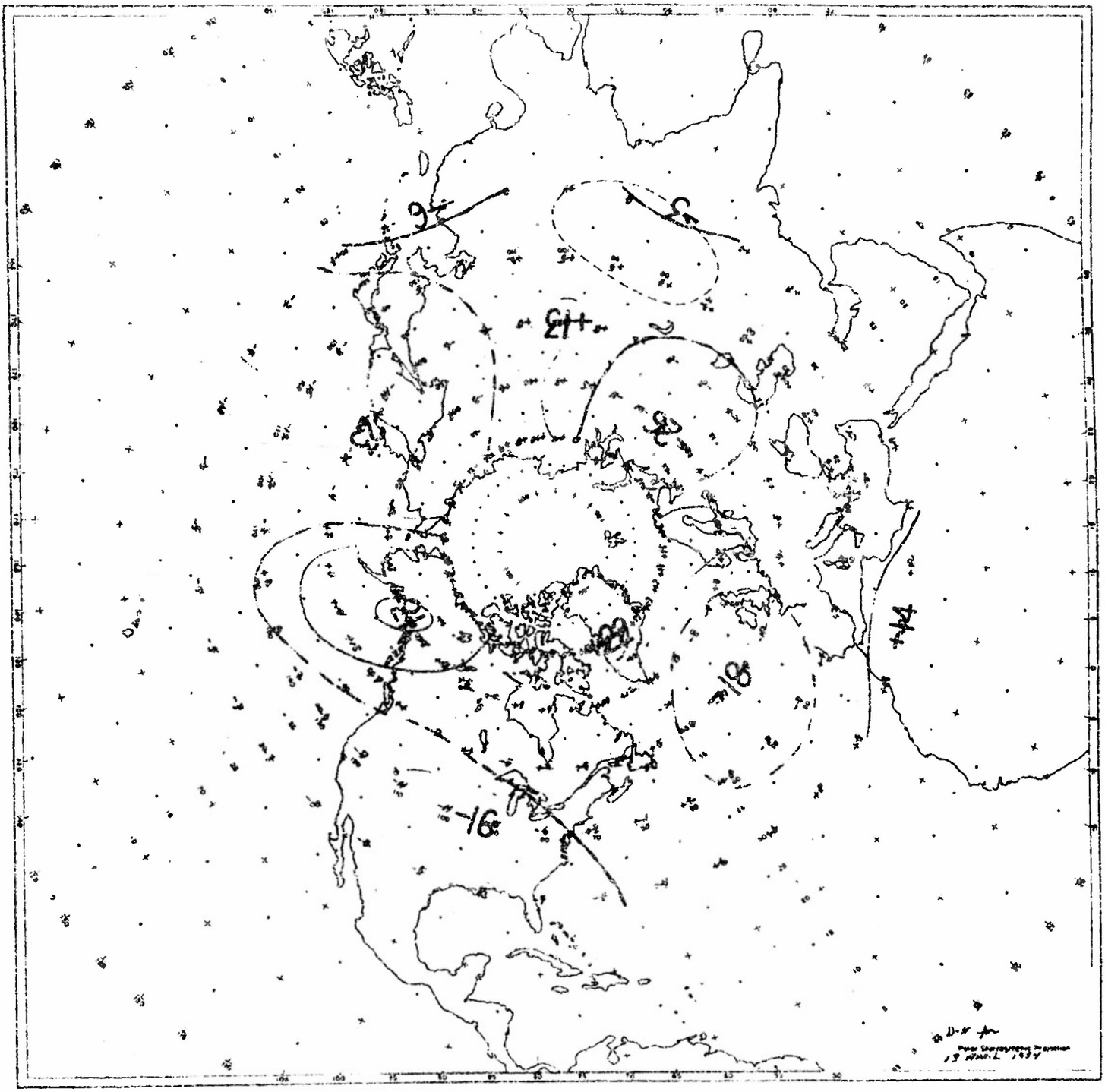

NORMAL - ACTUAL
8 APRIL 1954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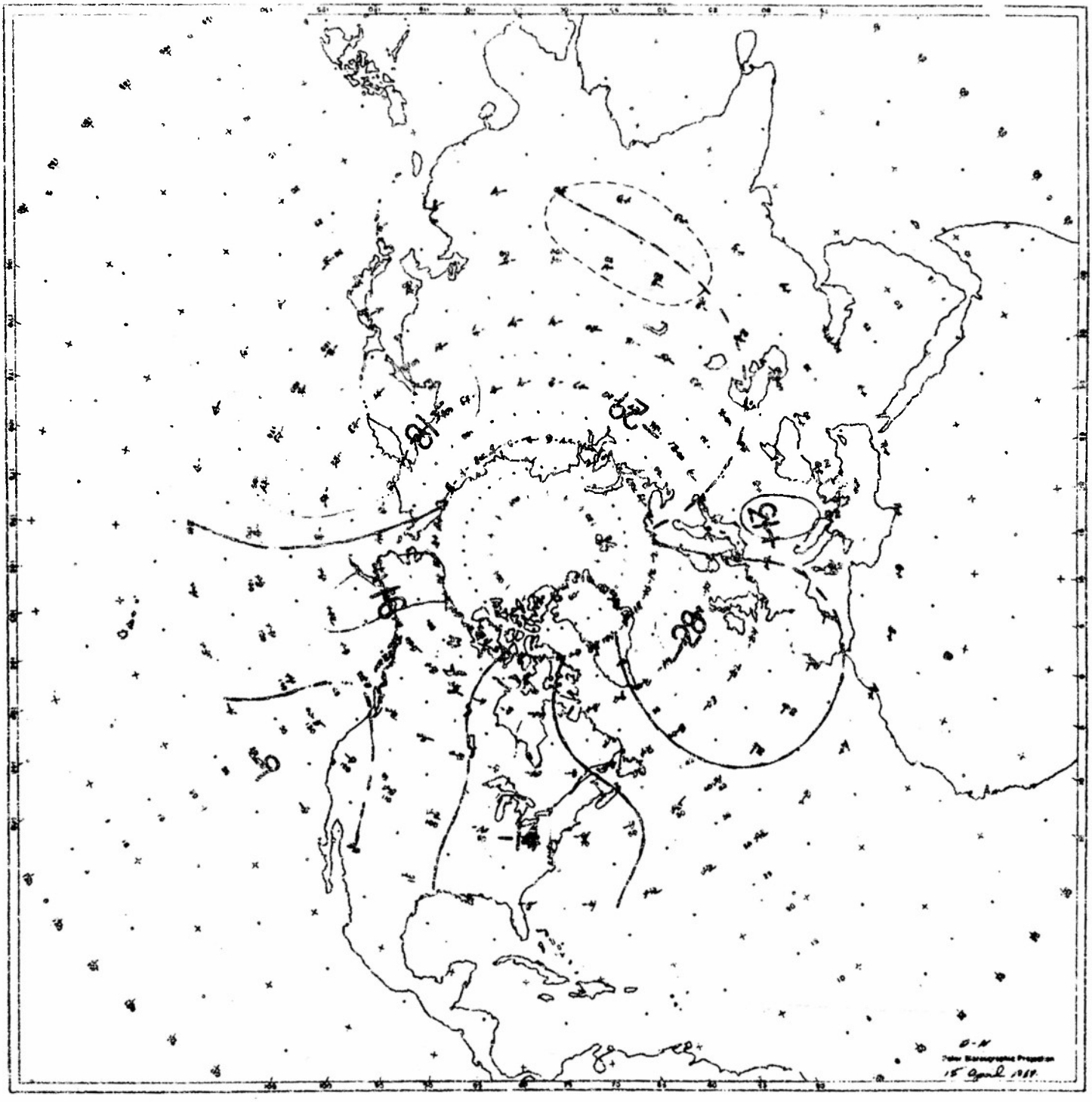
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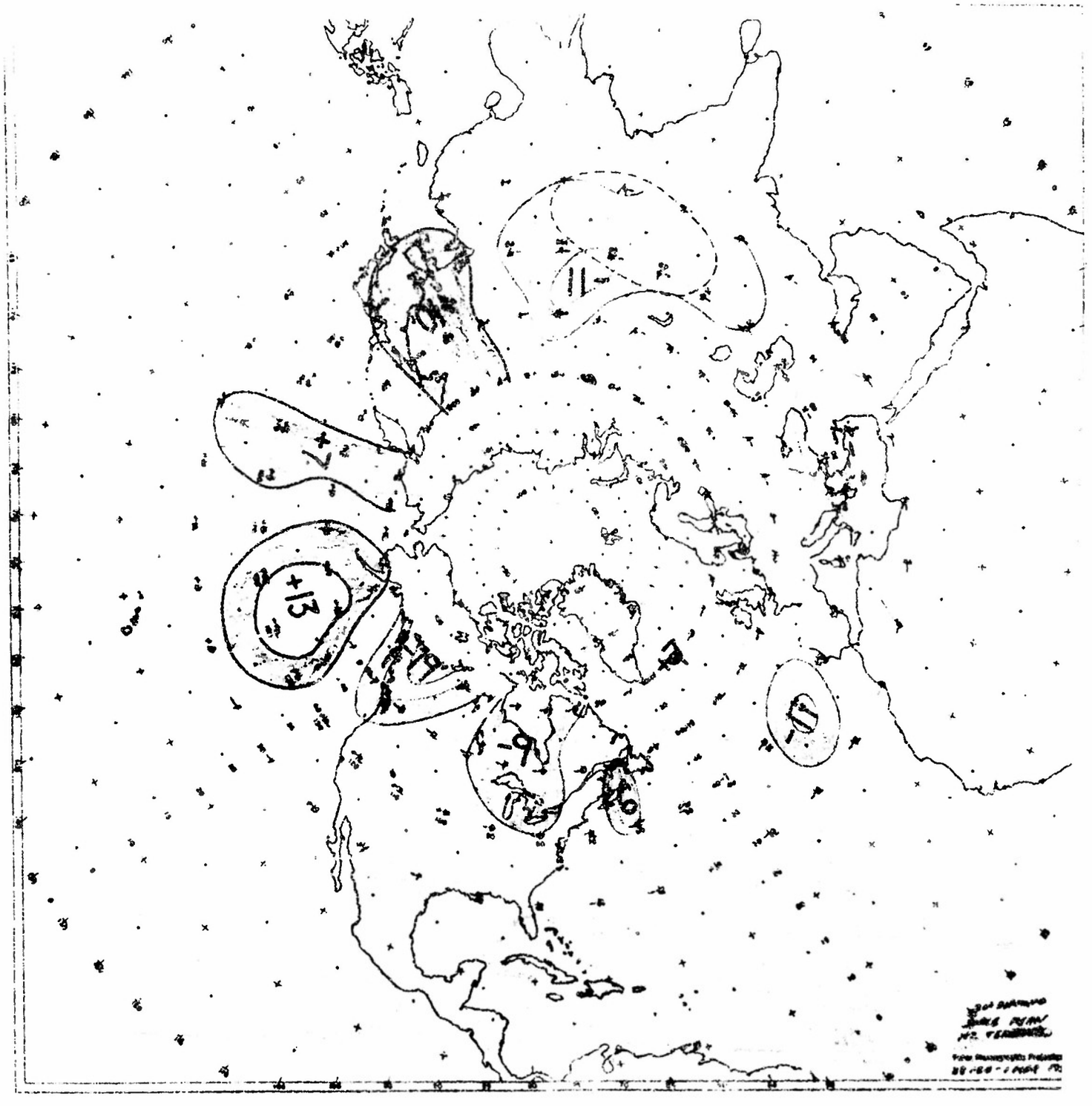
Polar Stereographic Projection
15 April 1969


+11
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+11
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-6
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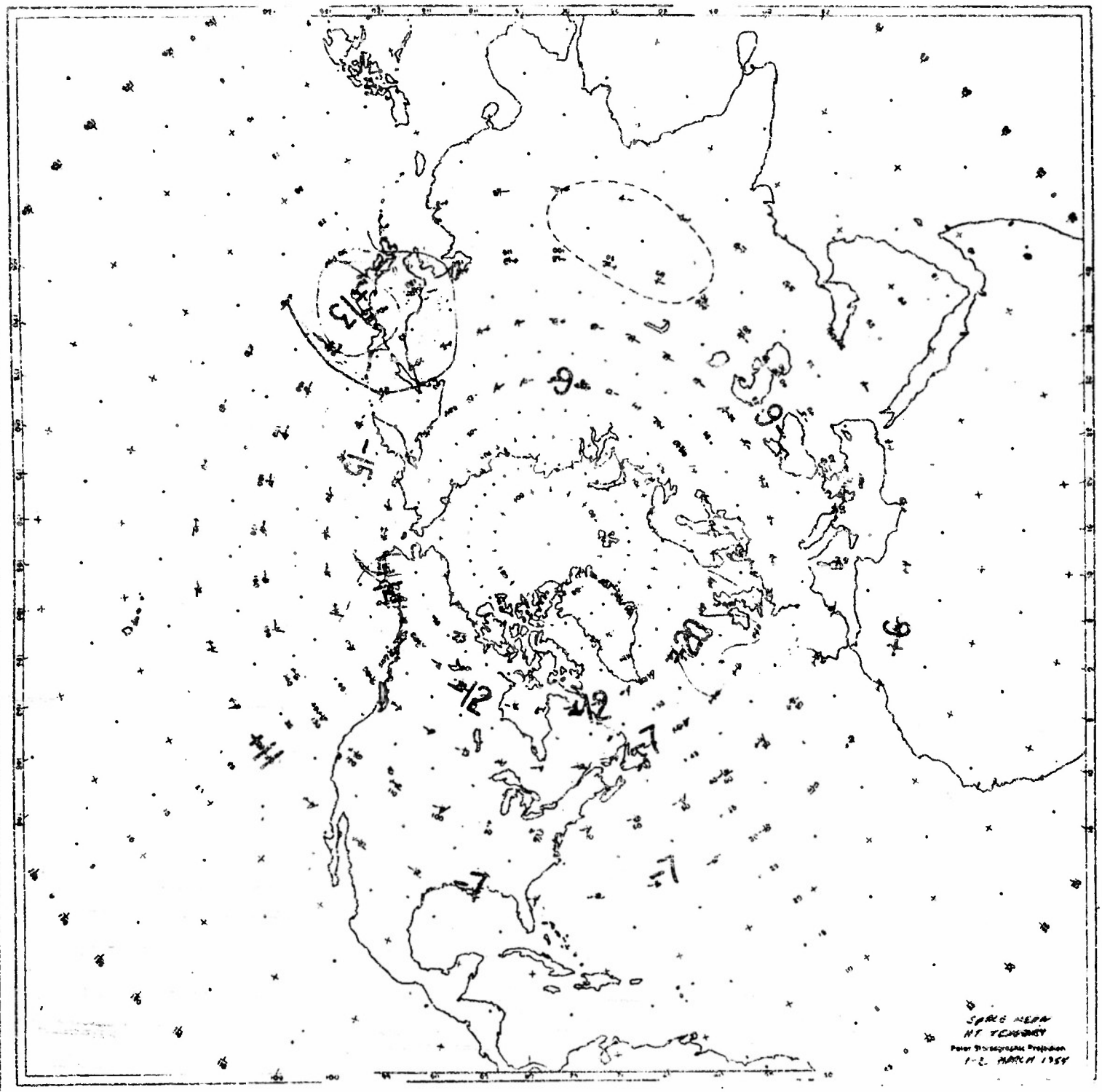
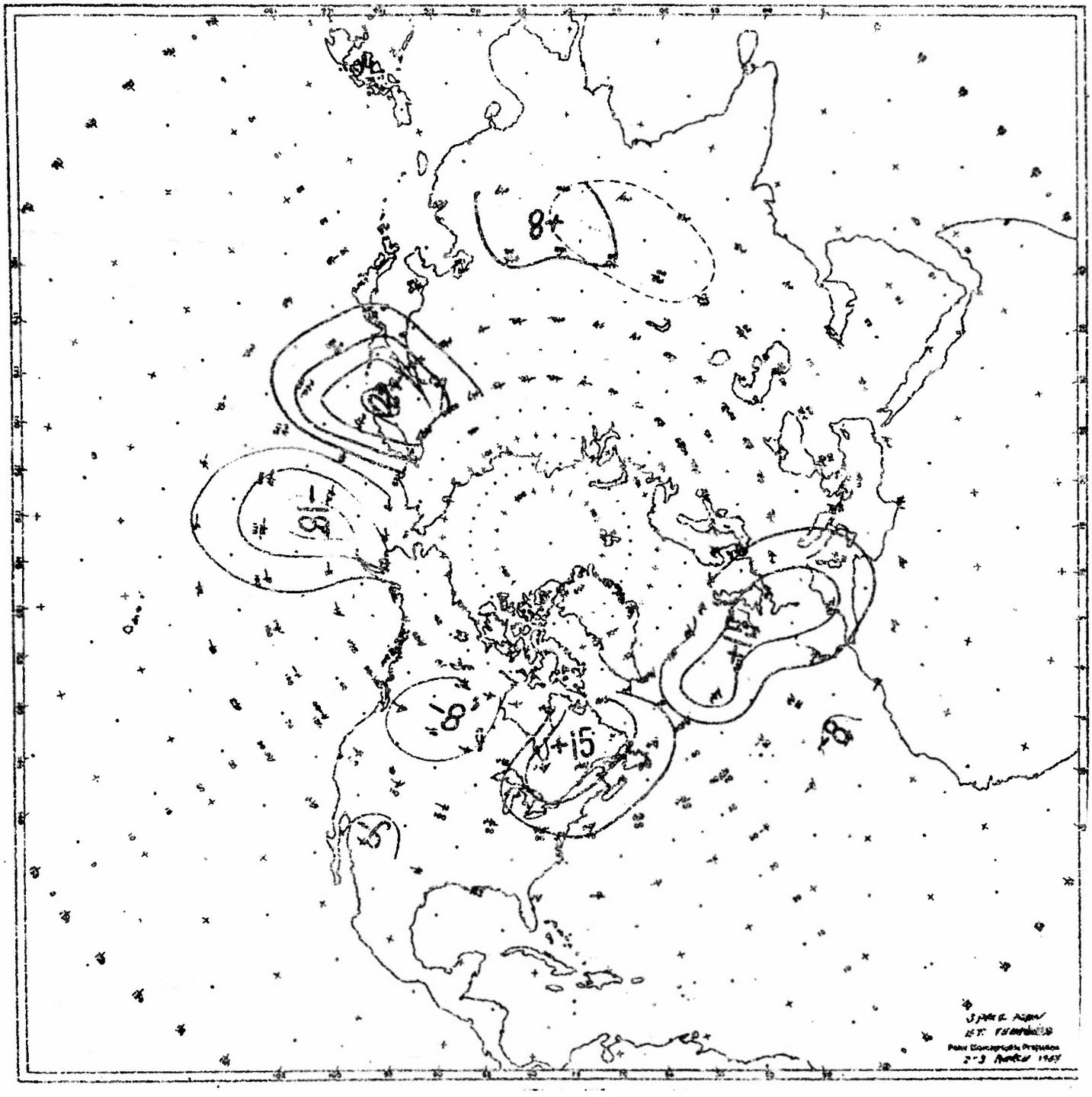

SPACE MEDICINE
MIT
Polar Stereographic Projection
1-2 MARCH 1954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-8
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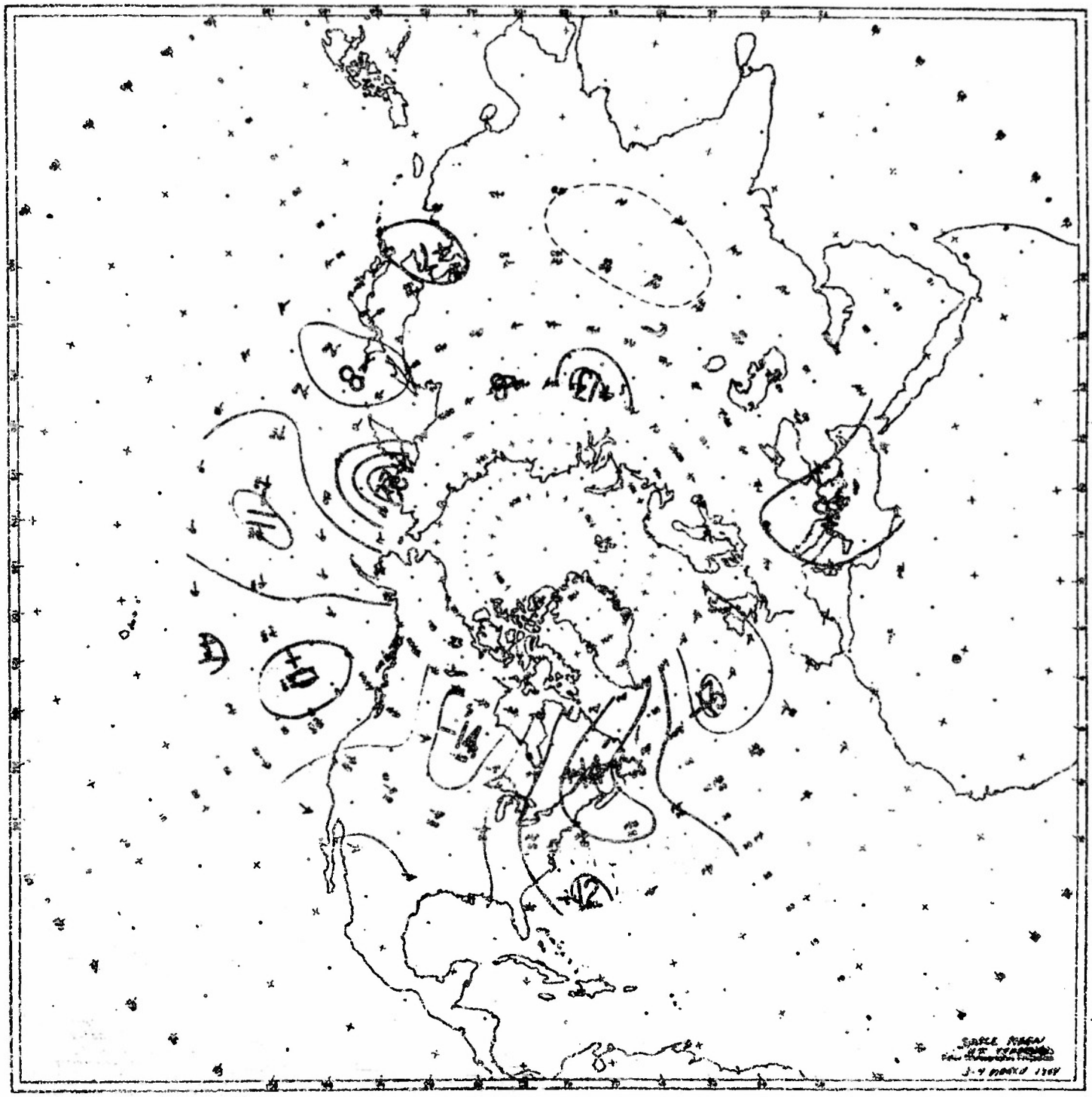
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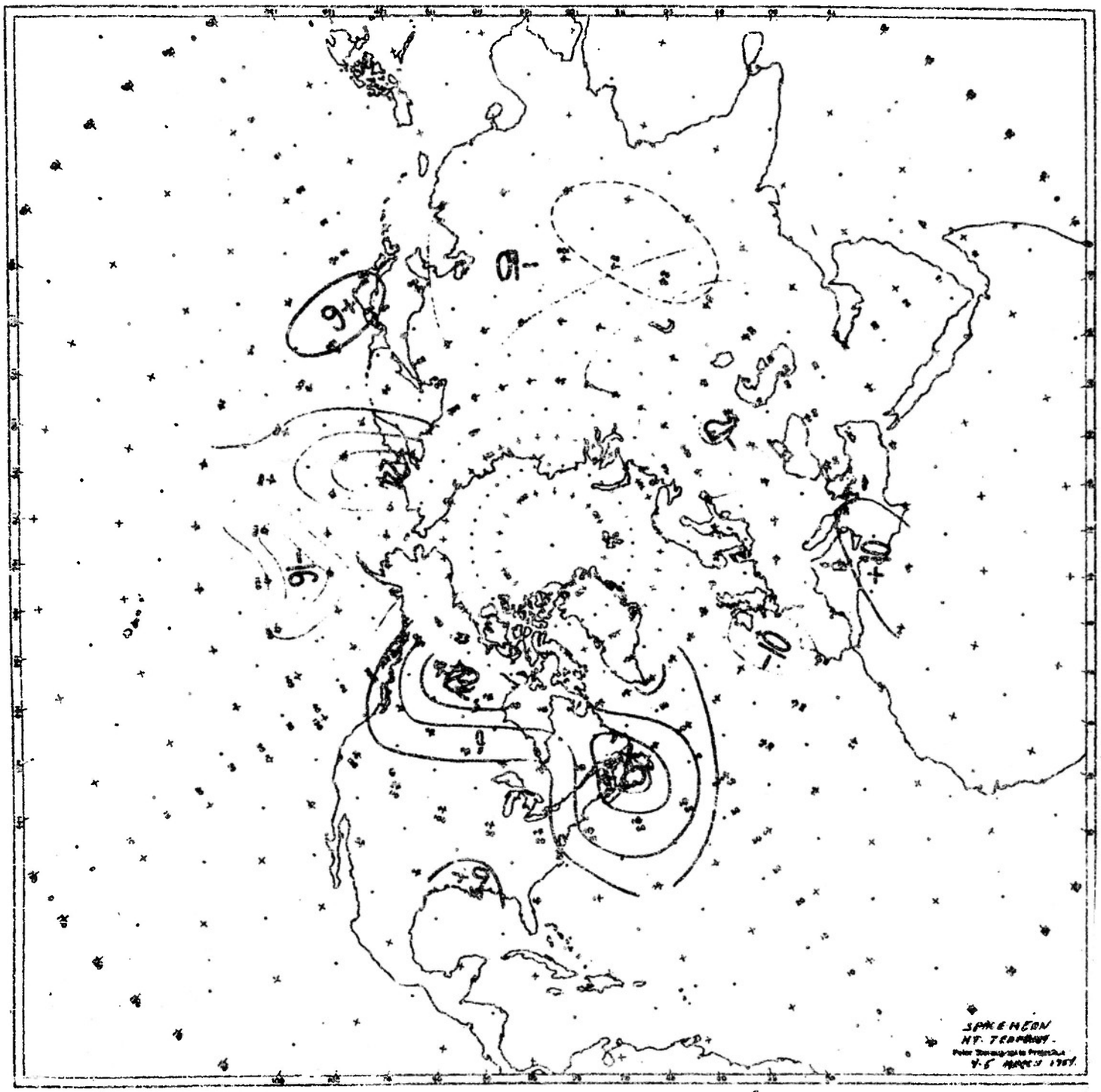
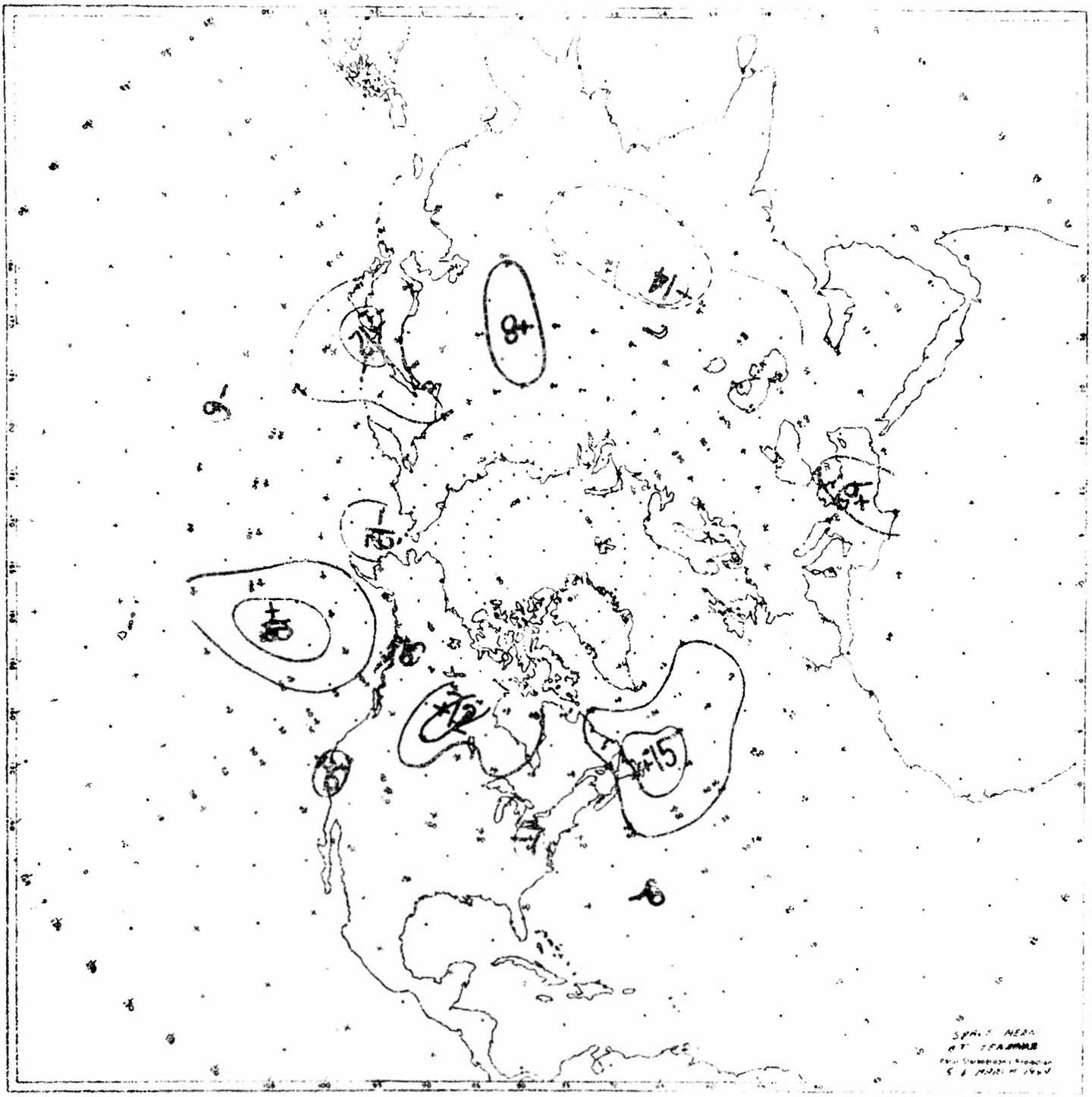

SPACEMEON
HT. TEMPERAT.
Polar Stereographic Projection
4-5 MARCH 1957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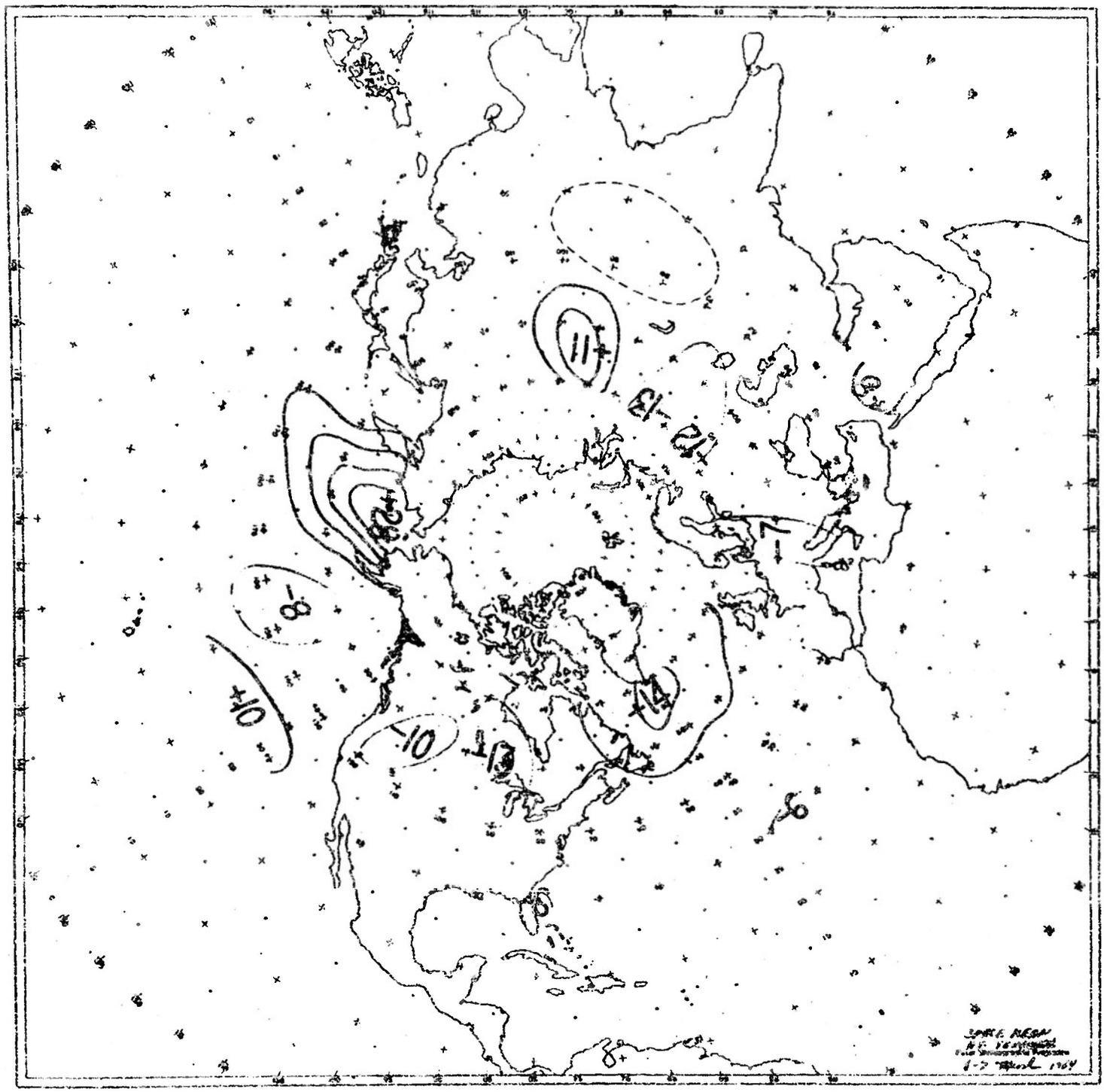
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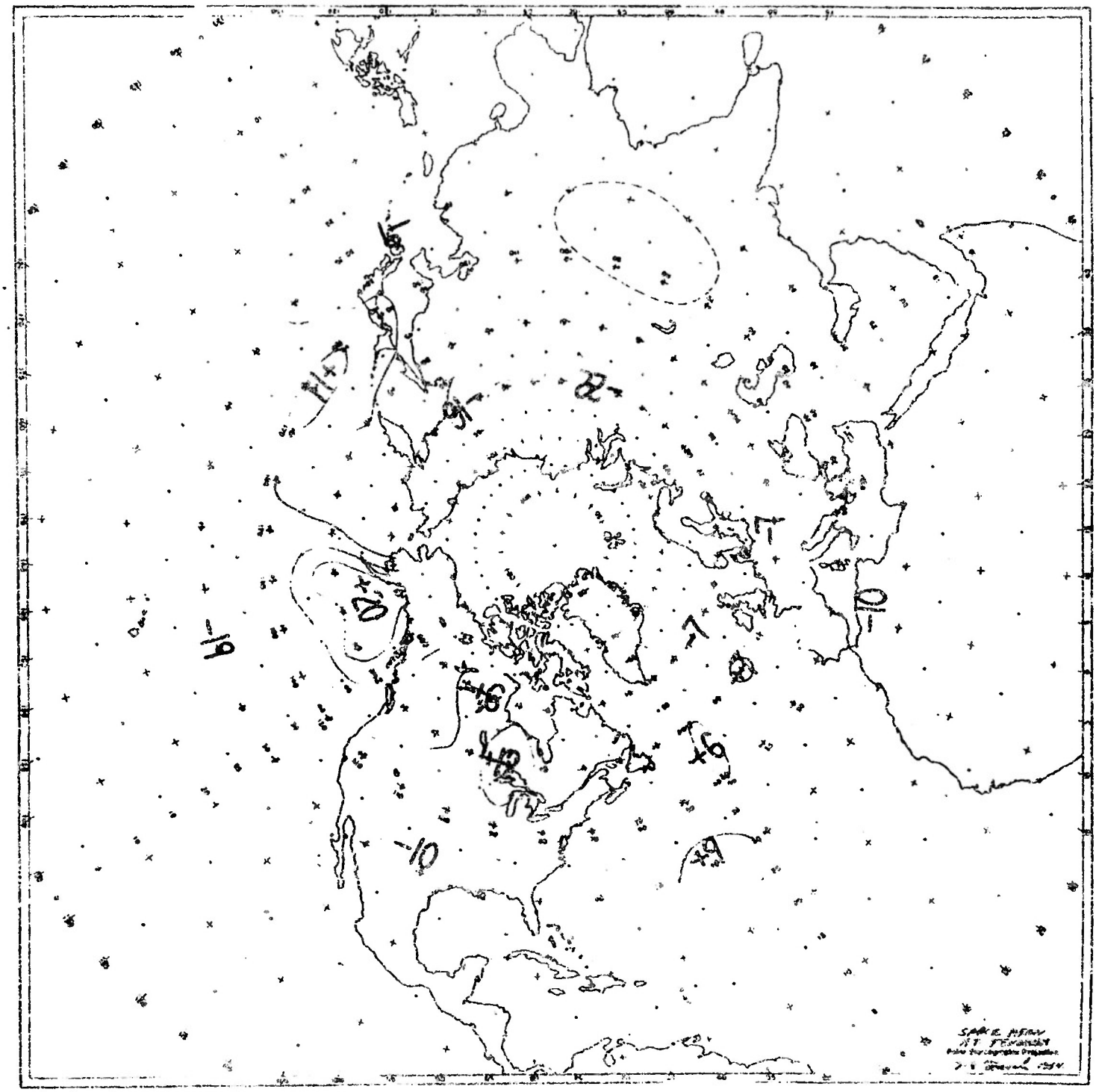

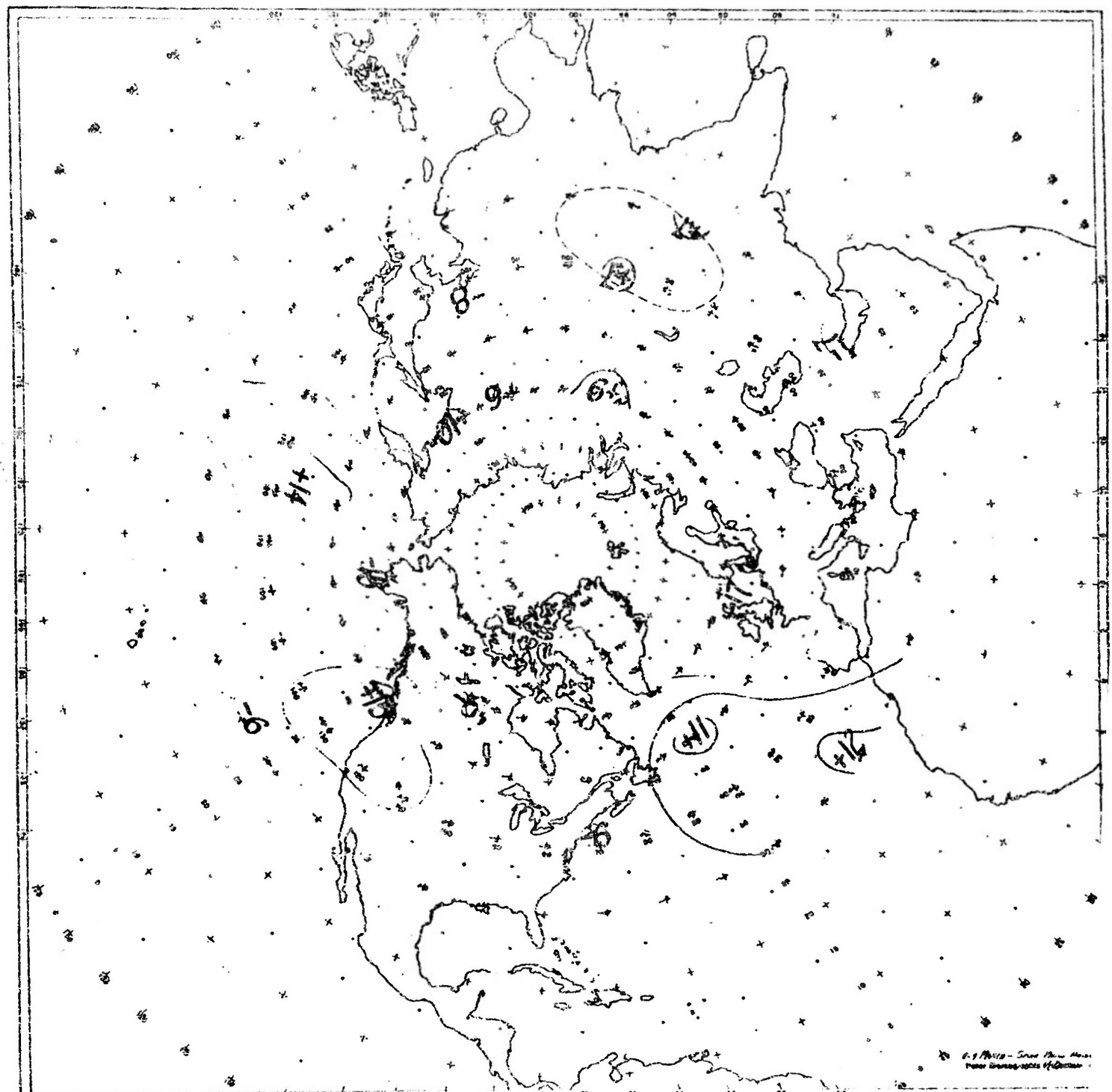

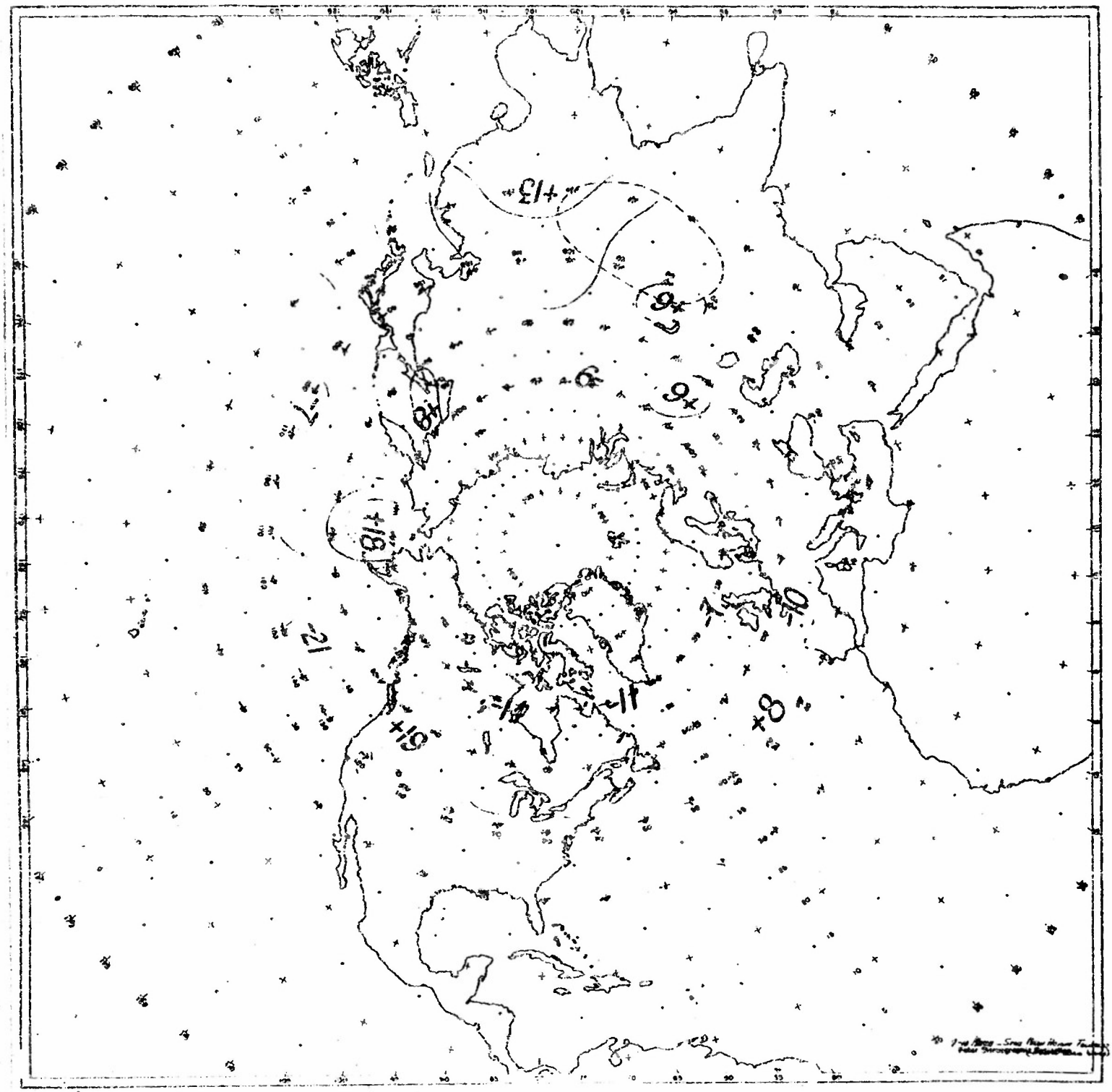
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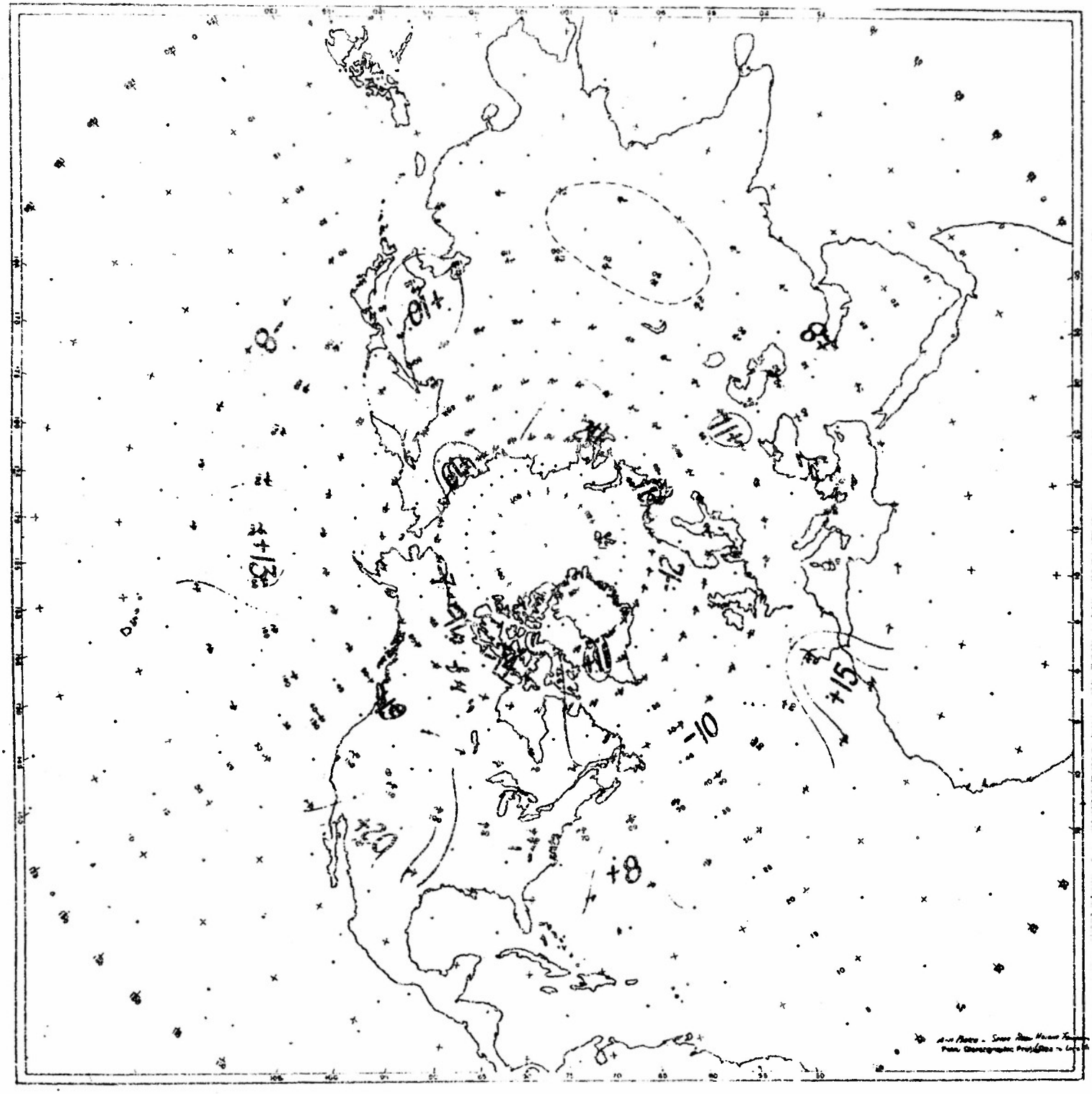
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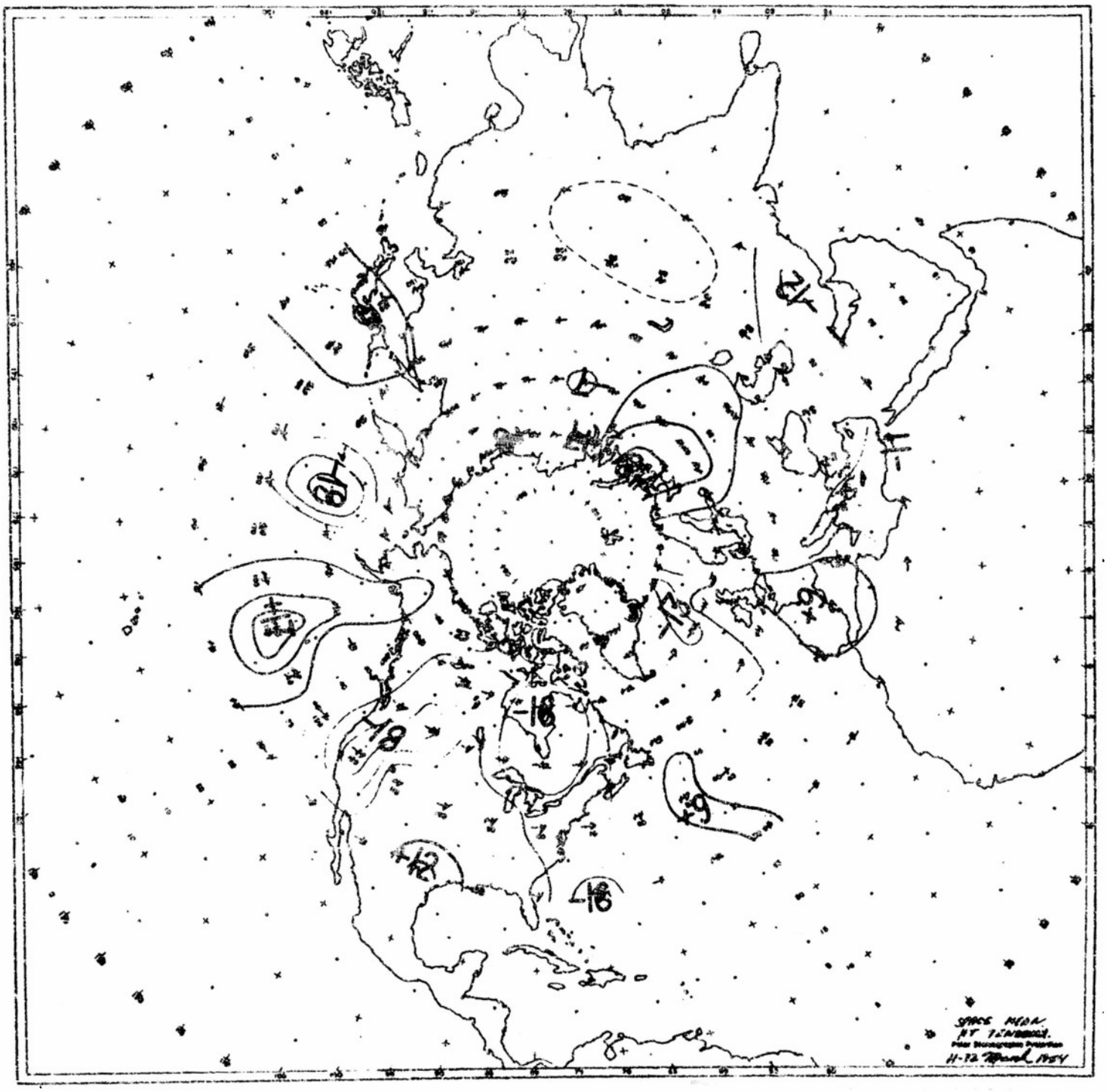
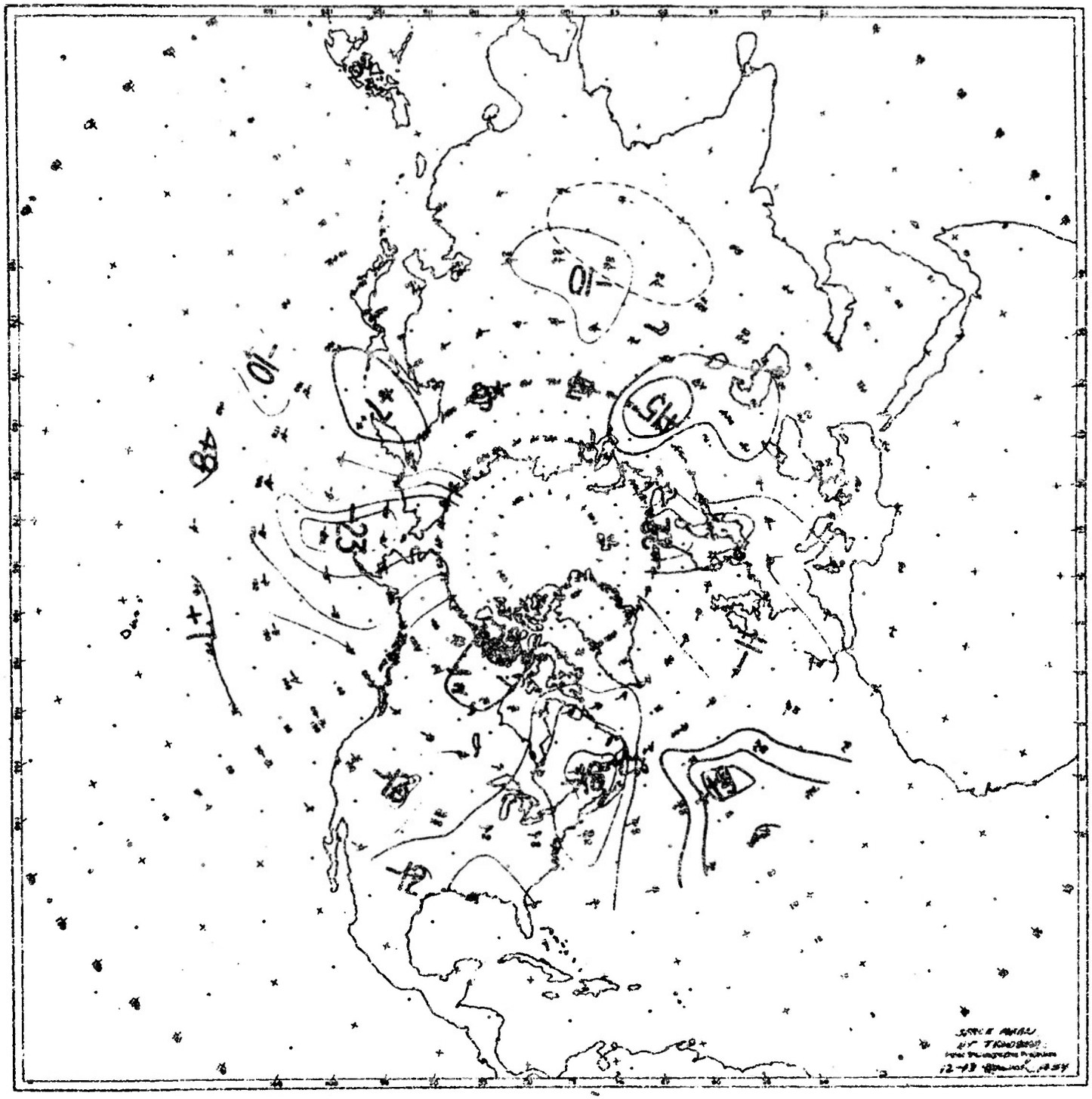

SPACE MEAN
Polar Stereographic Projection
11-72 March 1954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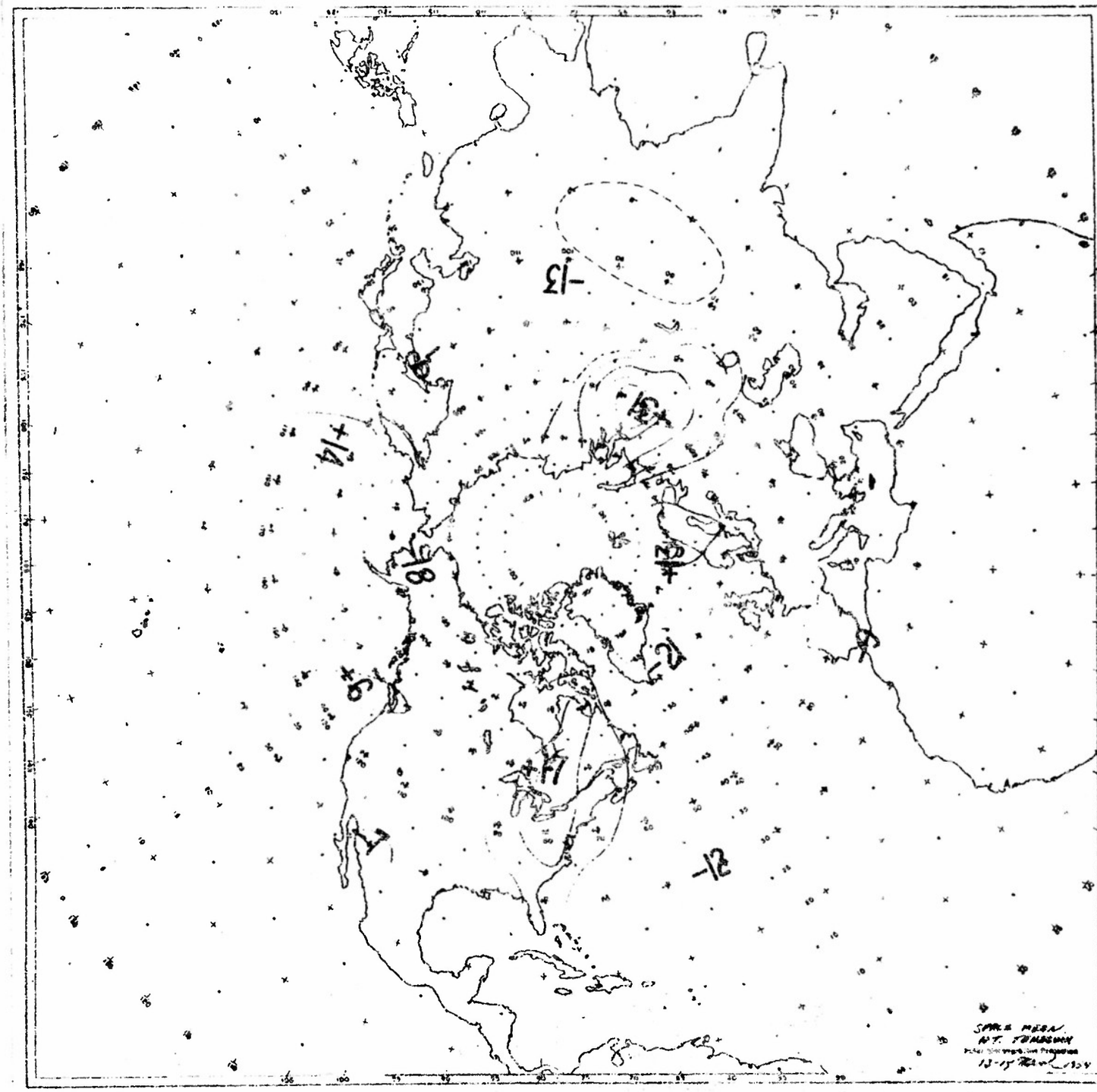
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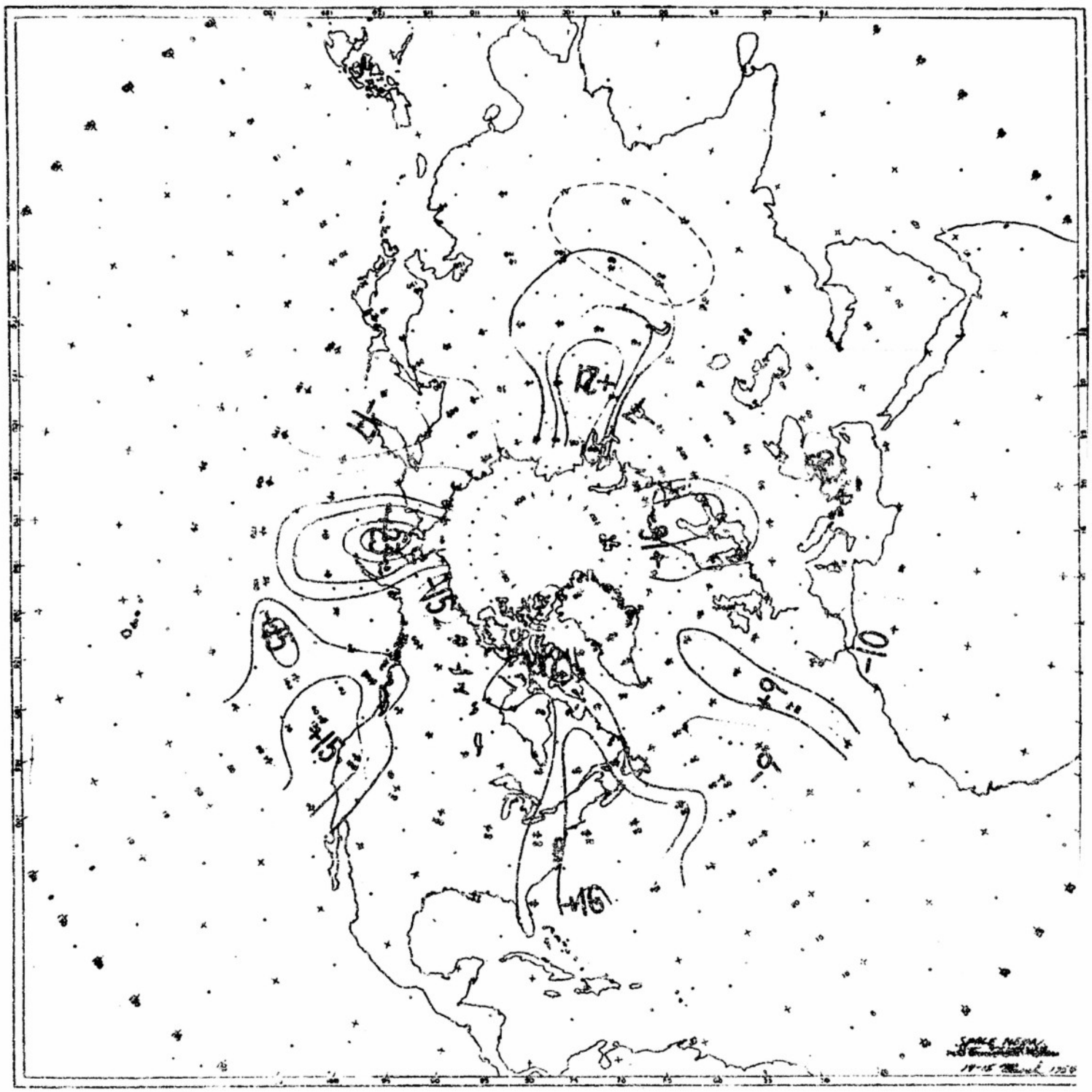
SPACE MEAN
N.T. TUNGUSKA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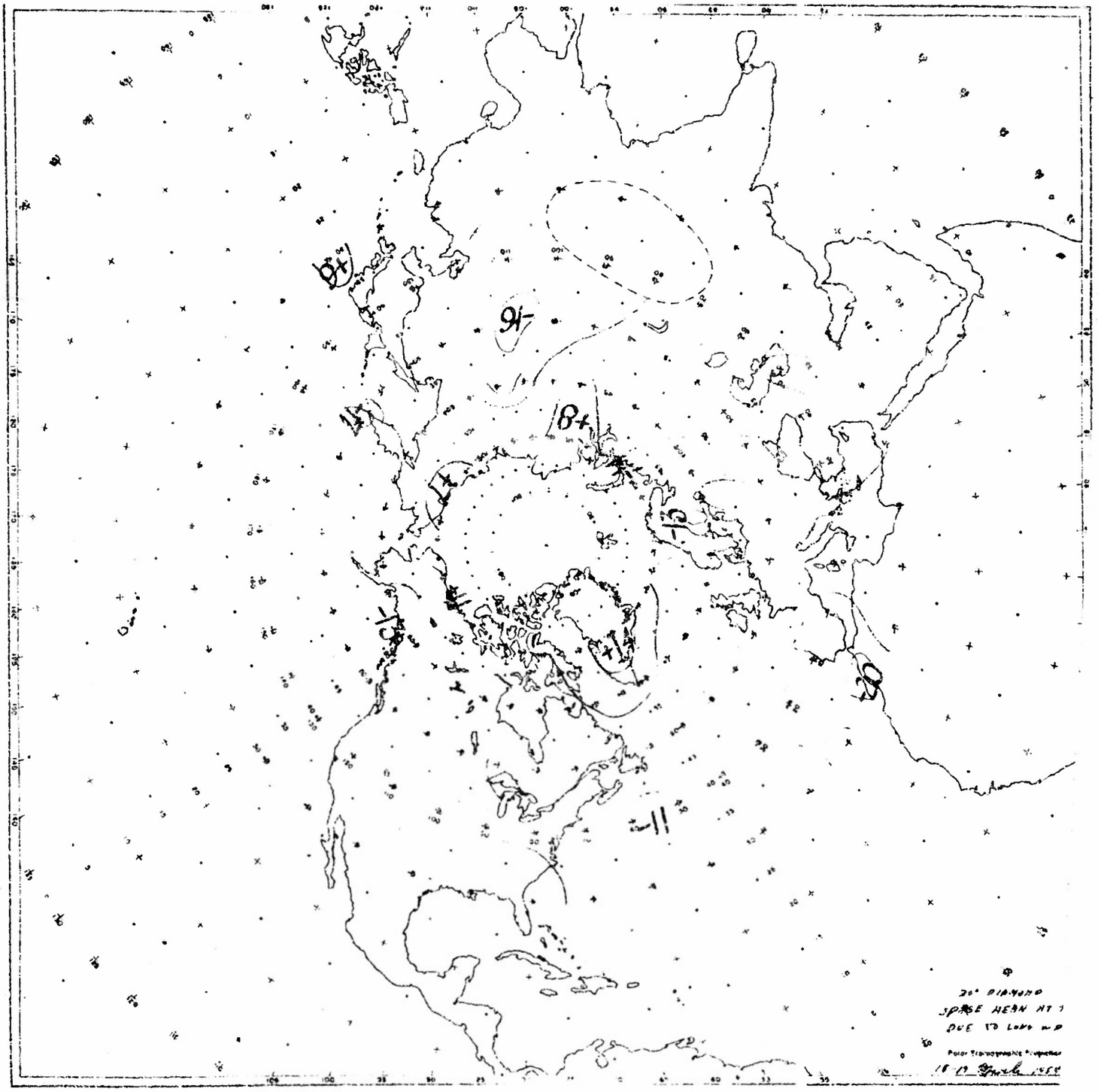
9+
9-
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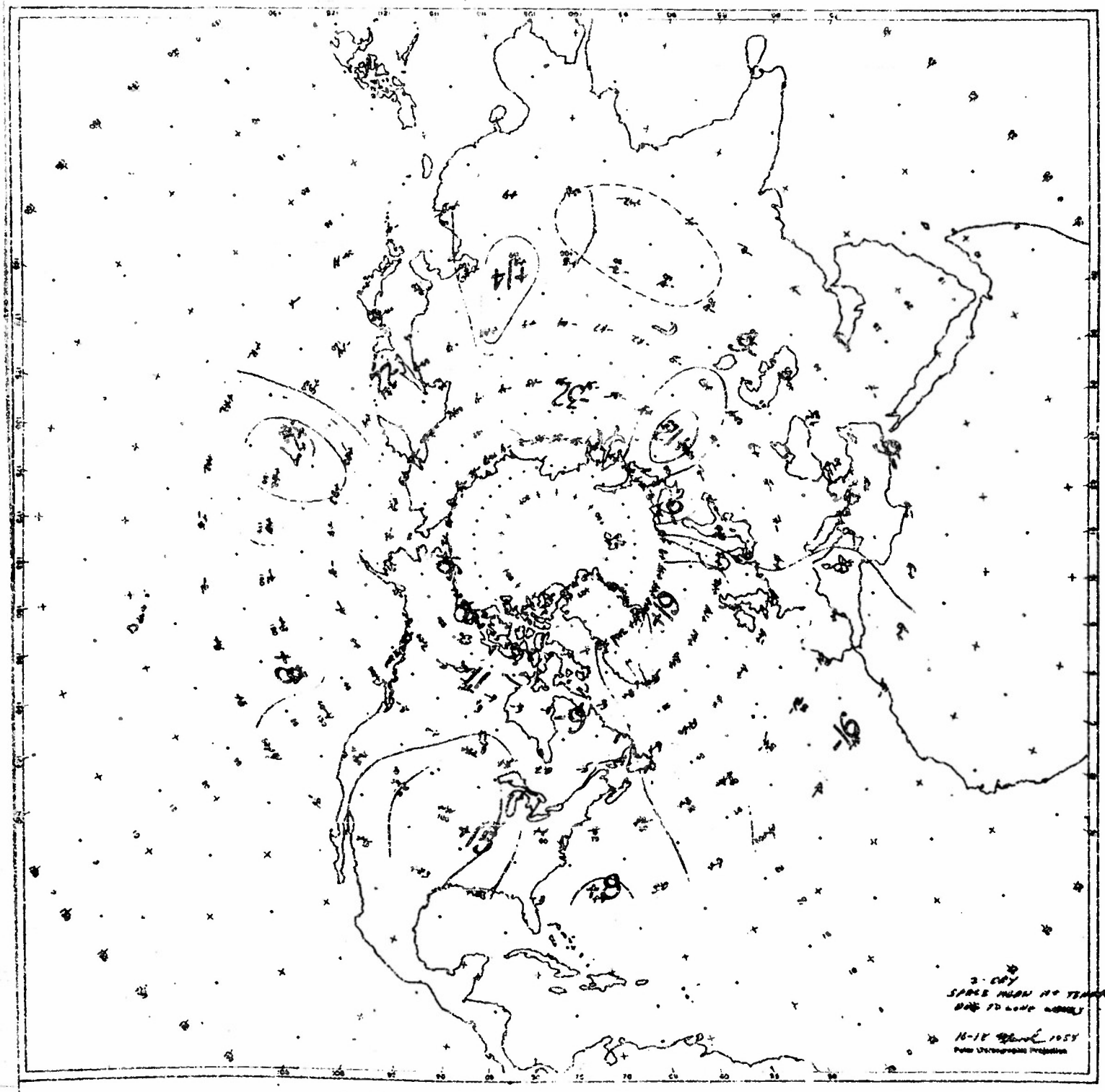
20° DIAMOND
SPACE MEAN HT
DUE TO LONG WD
Polar Stereographic Projection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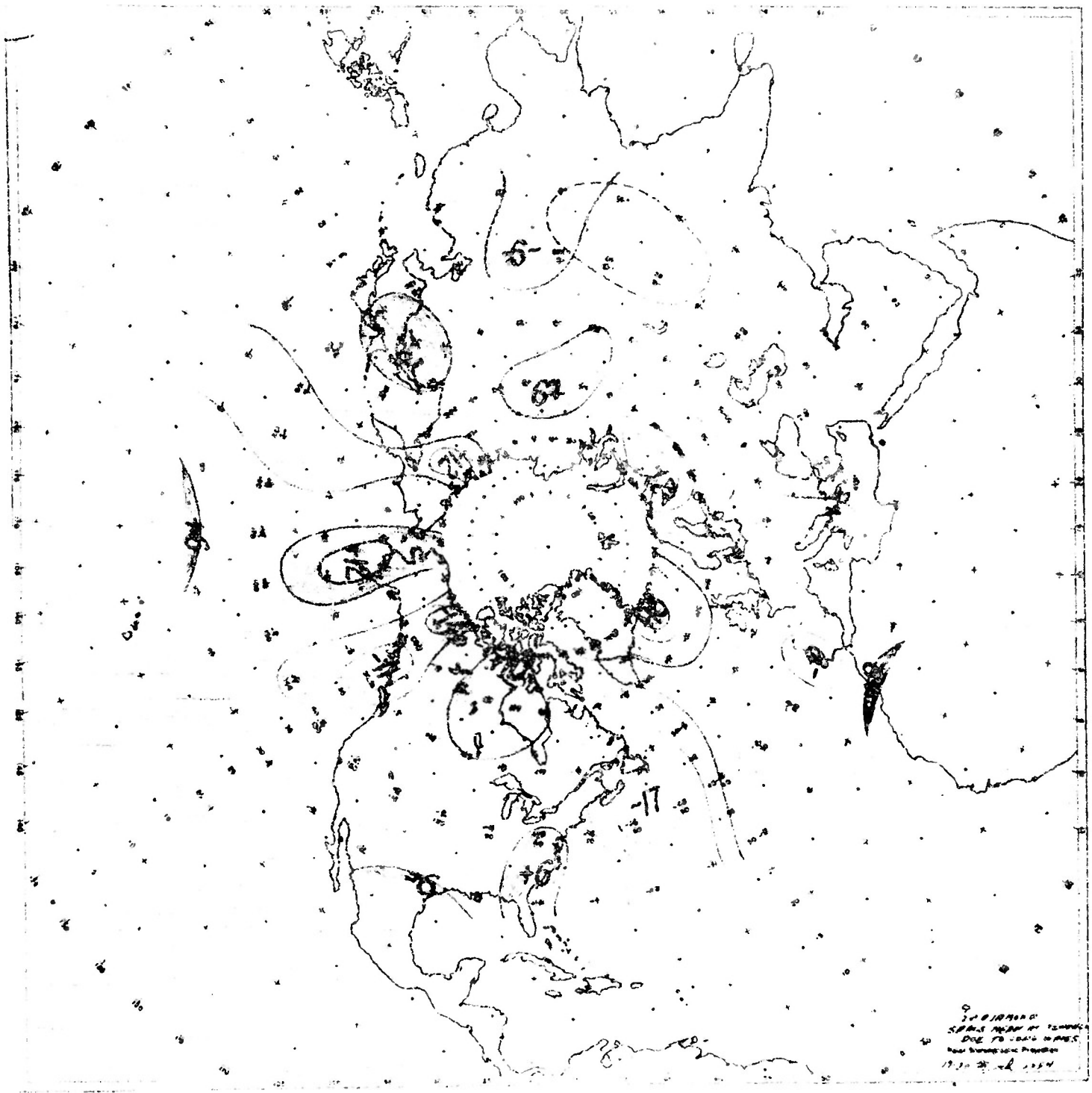
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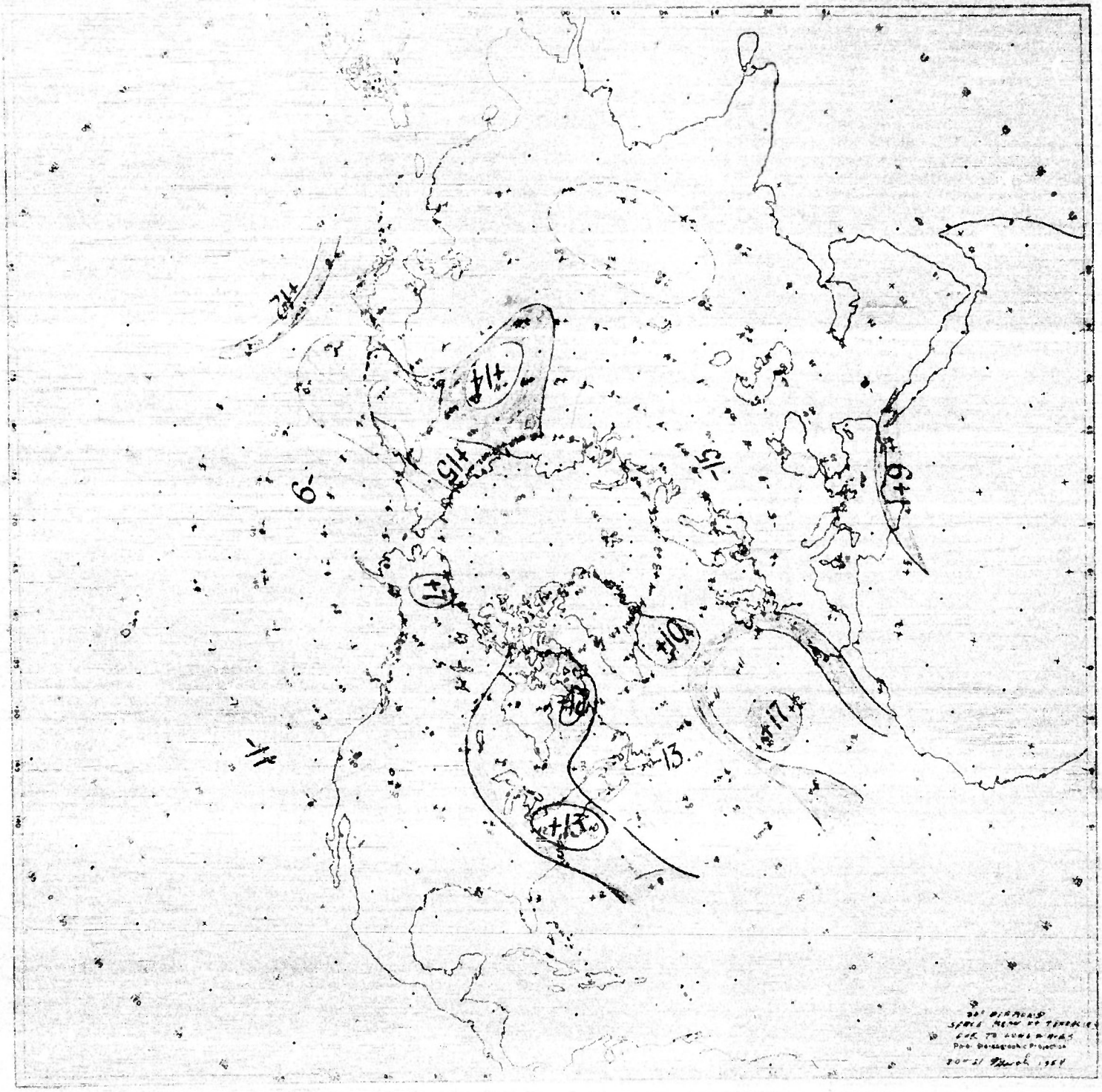
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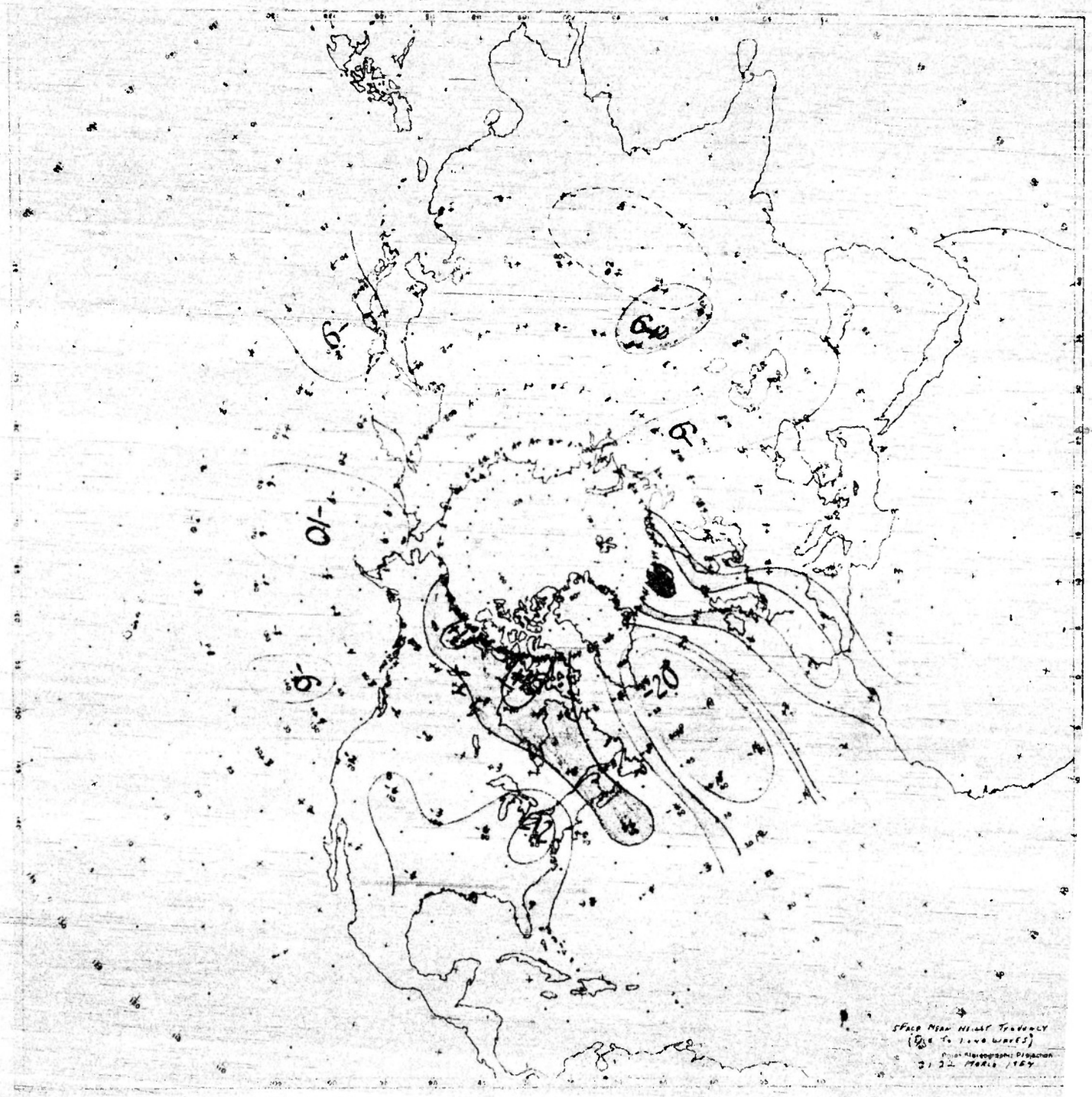
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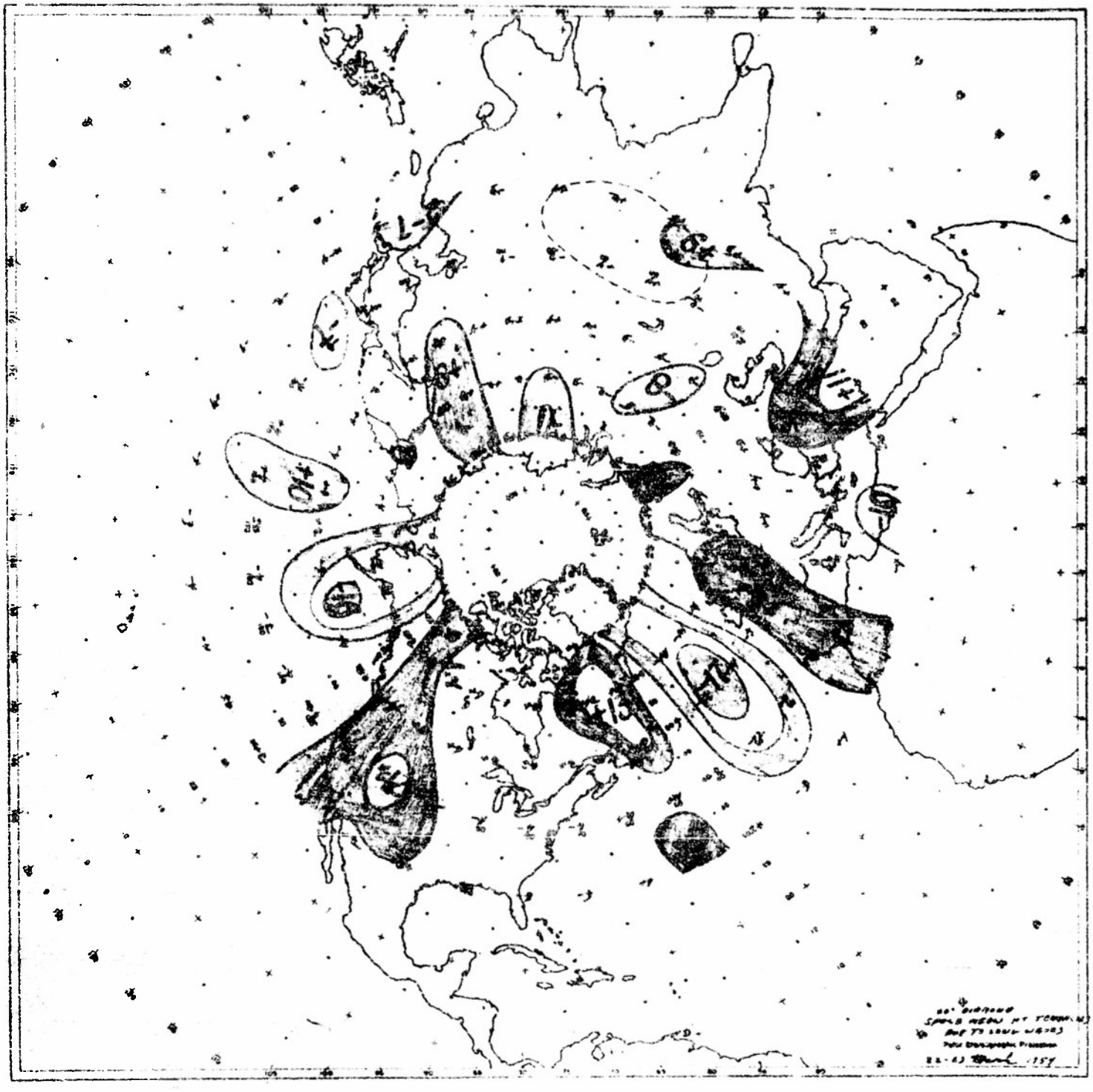
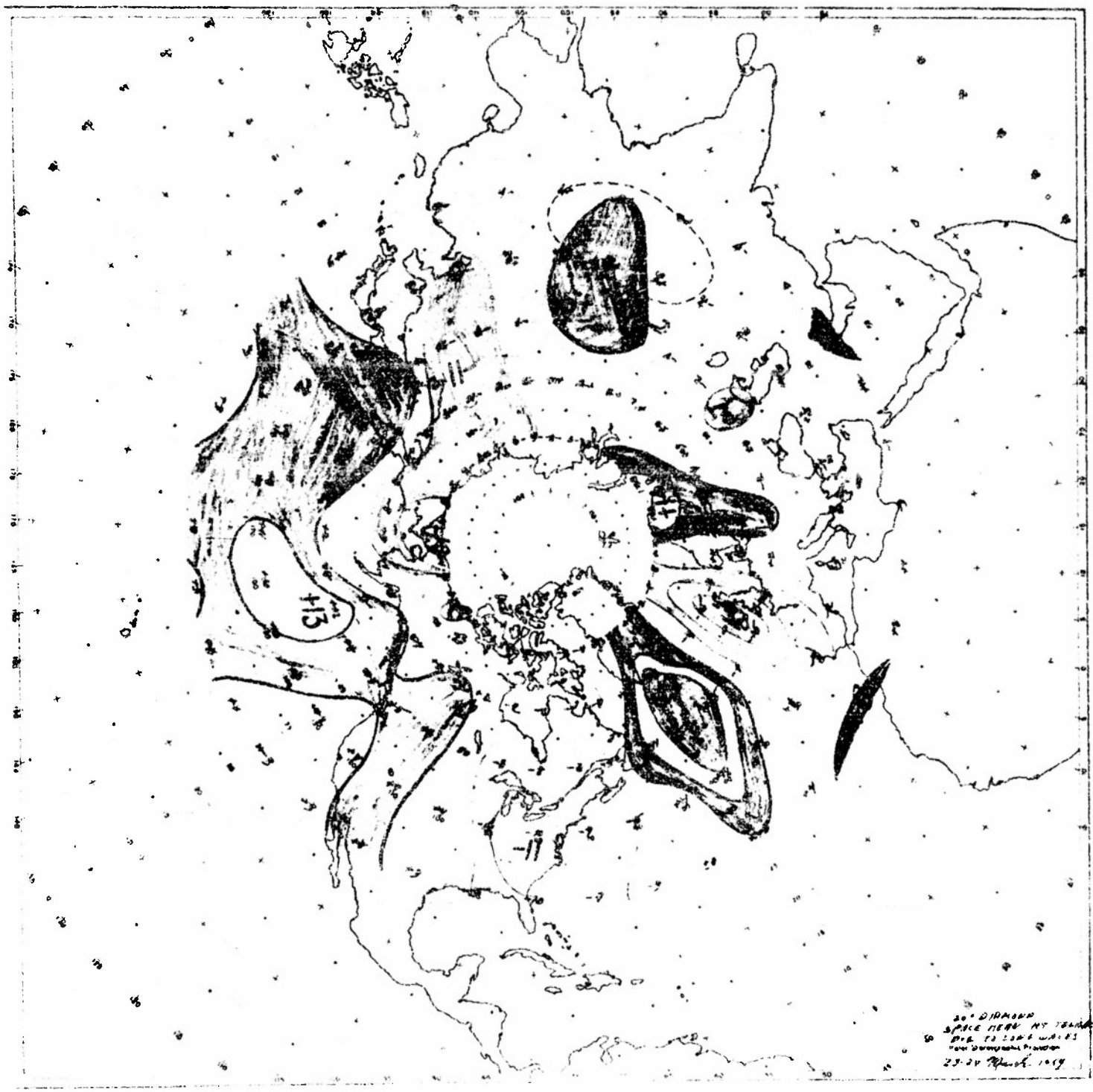
SPACE MEAN HEIGHT TENDENCY
(DUE TO LONG WAVES)
Polar Stereographic Projection
21 22 MARCH 1964

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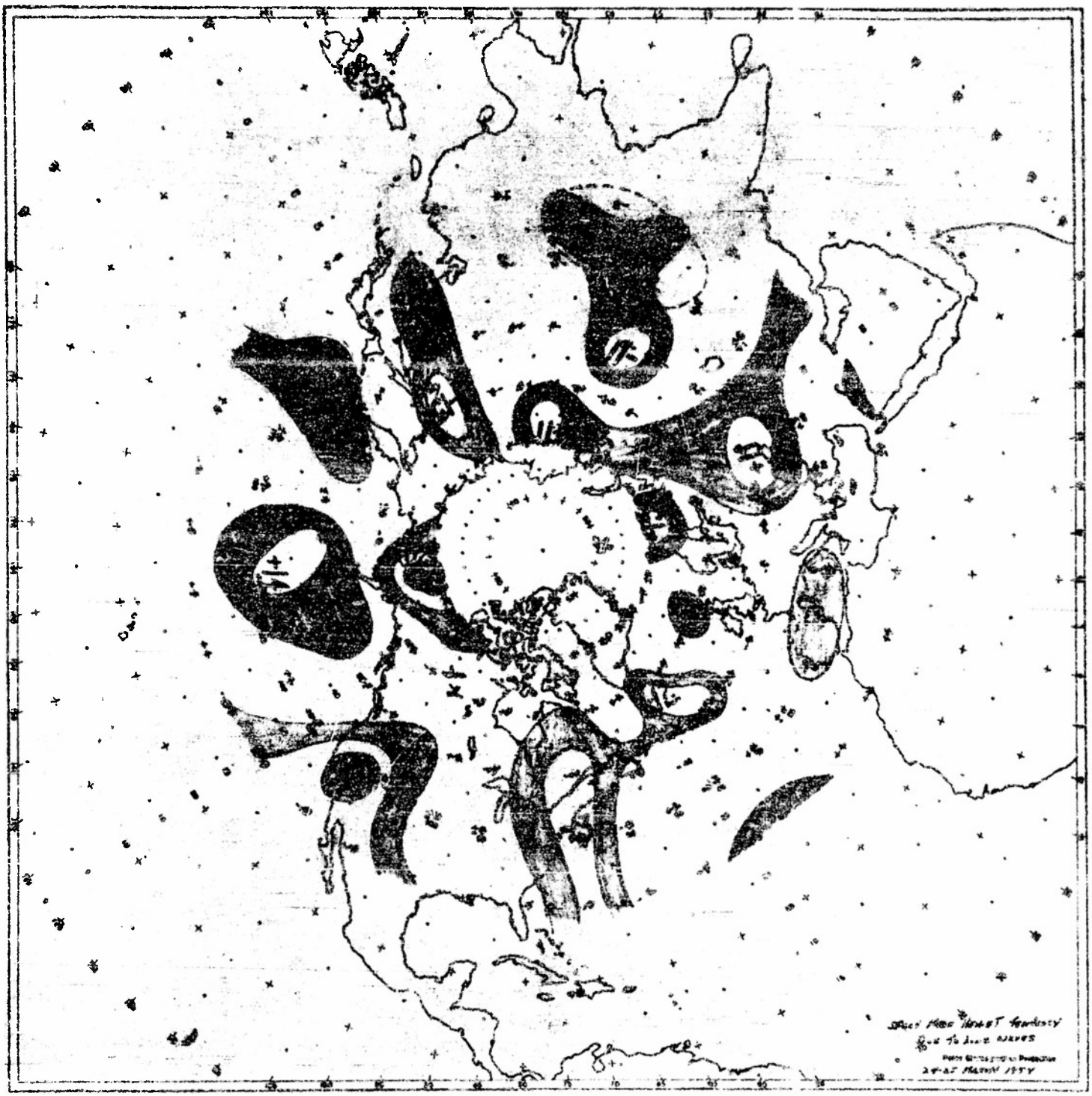
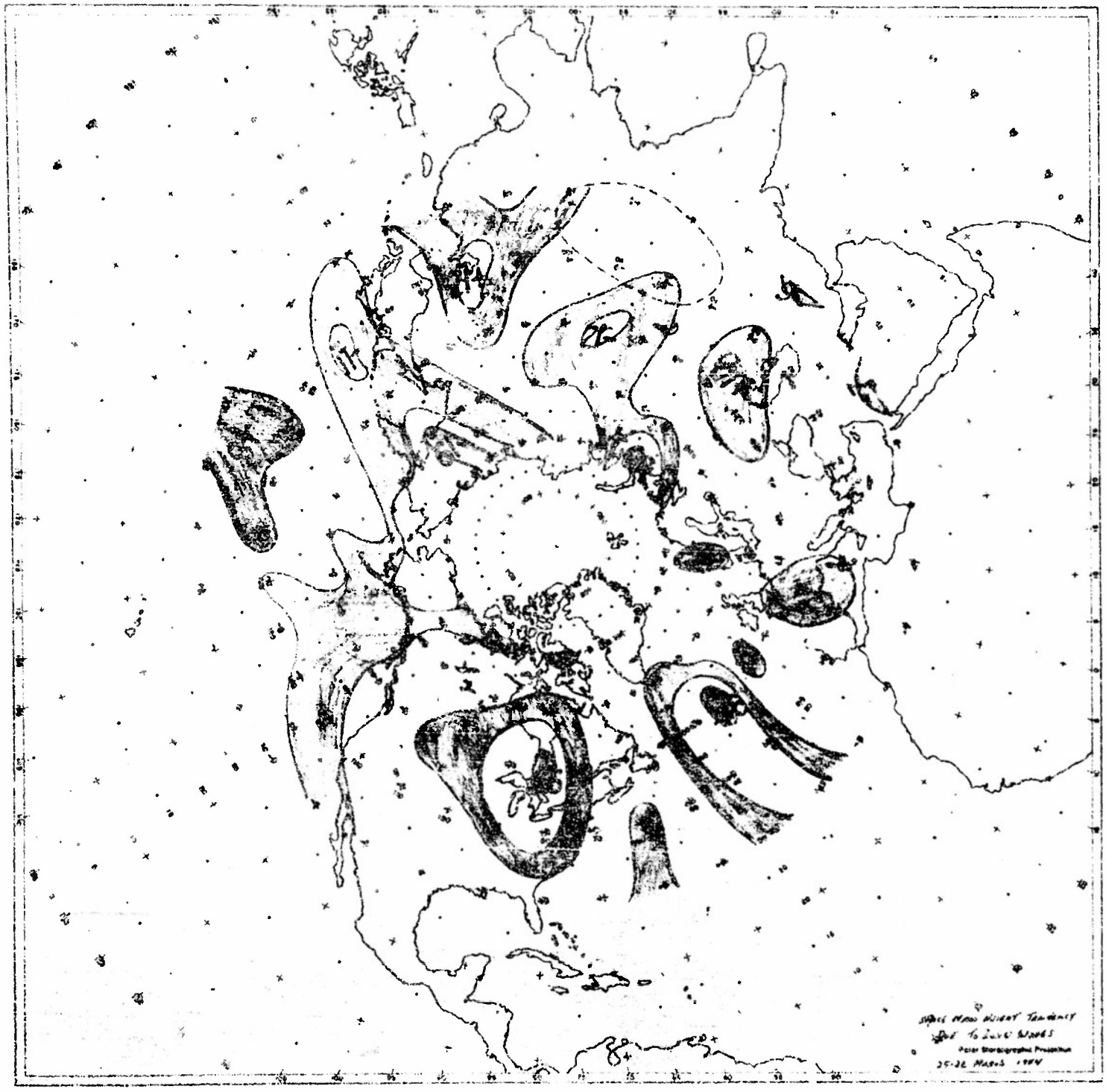
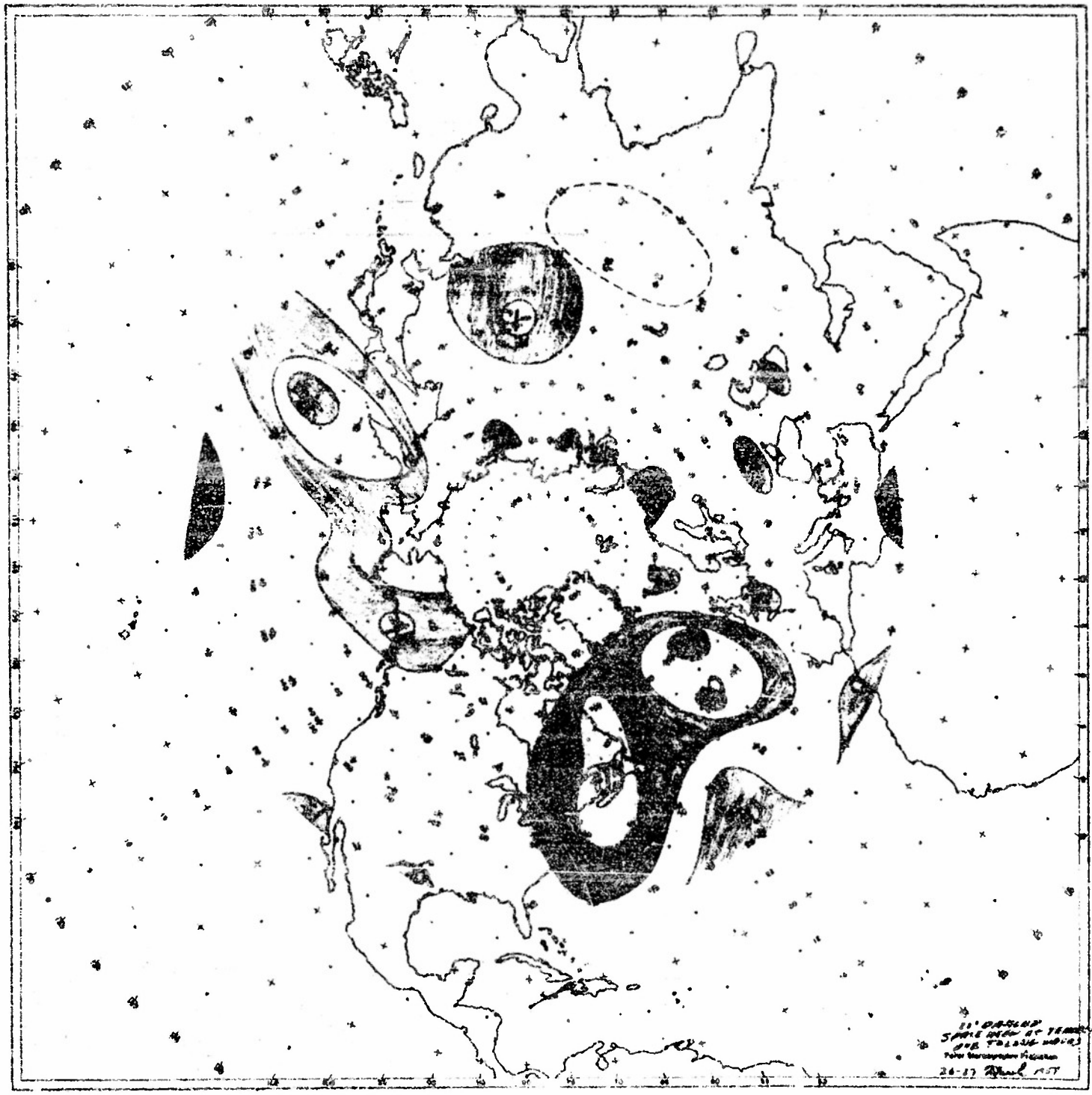
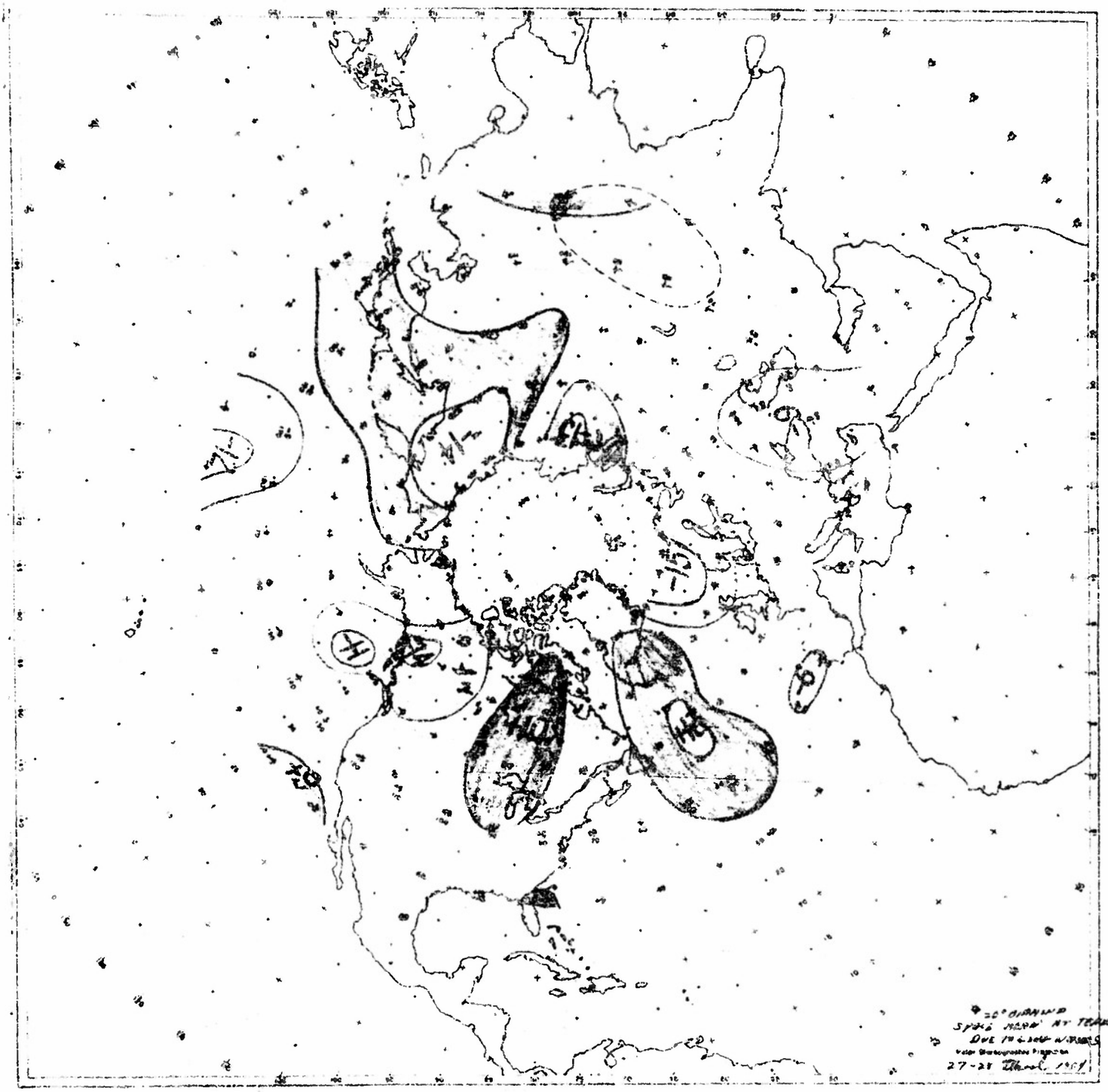
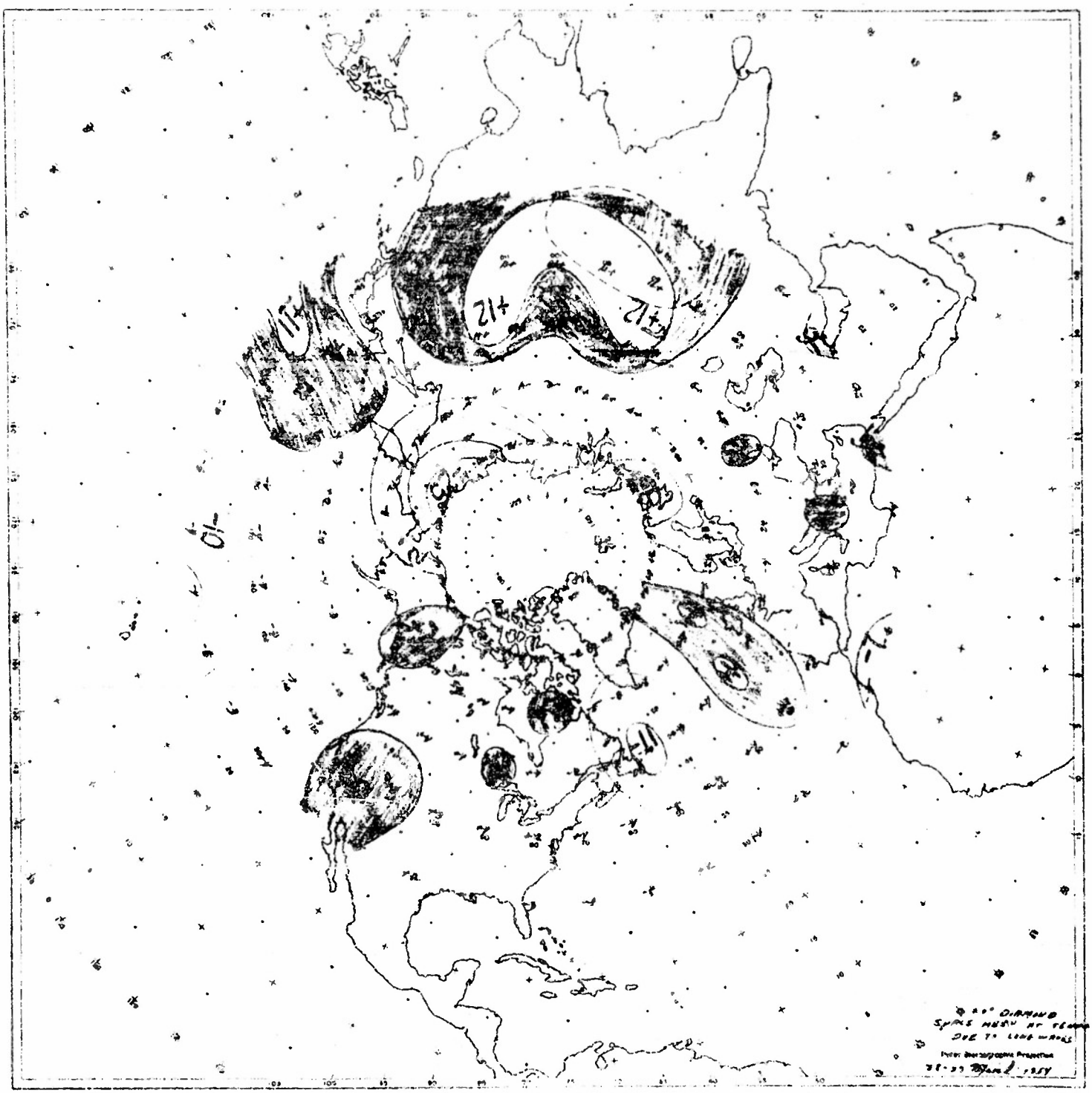



Polar Stereographic Projection



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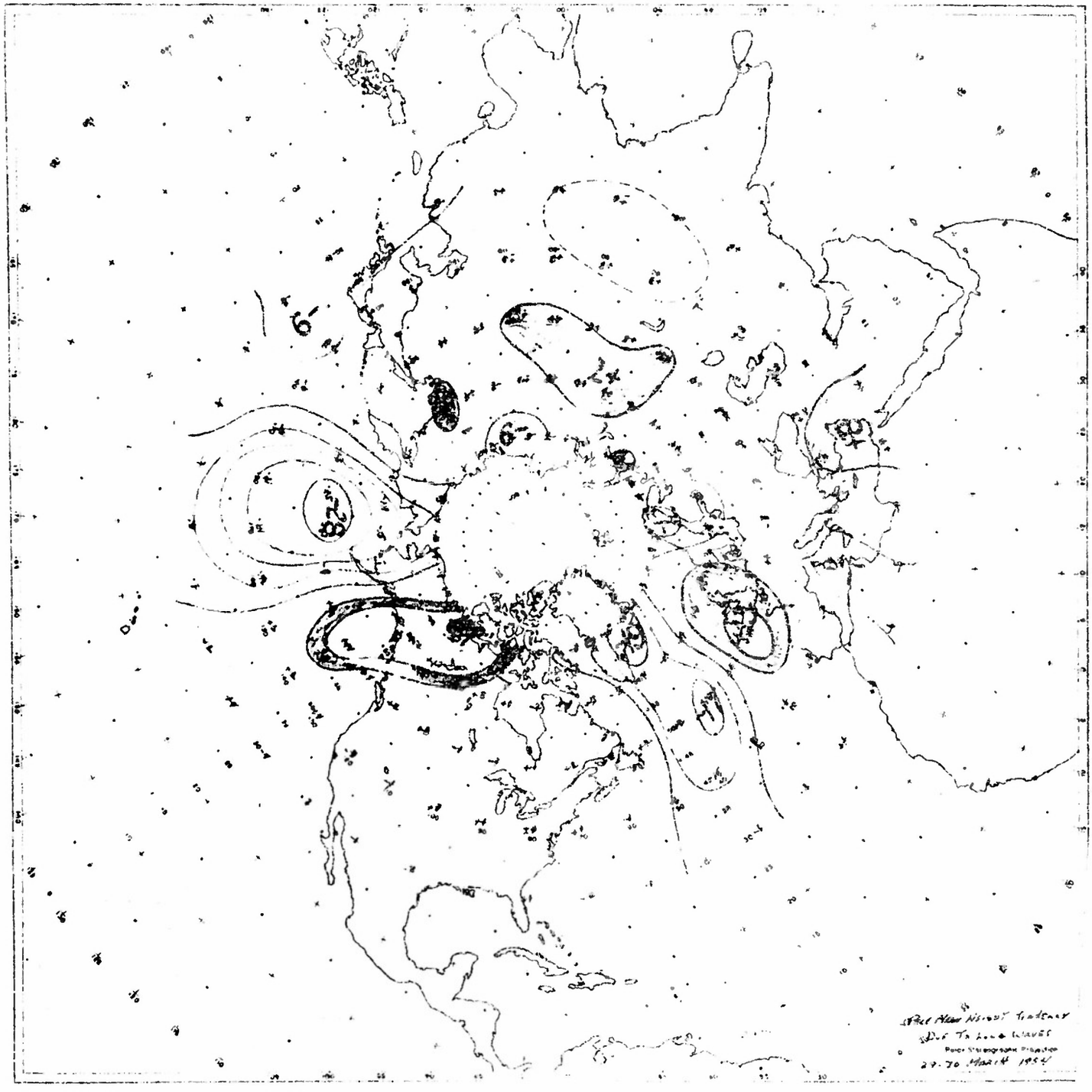
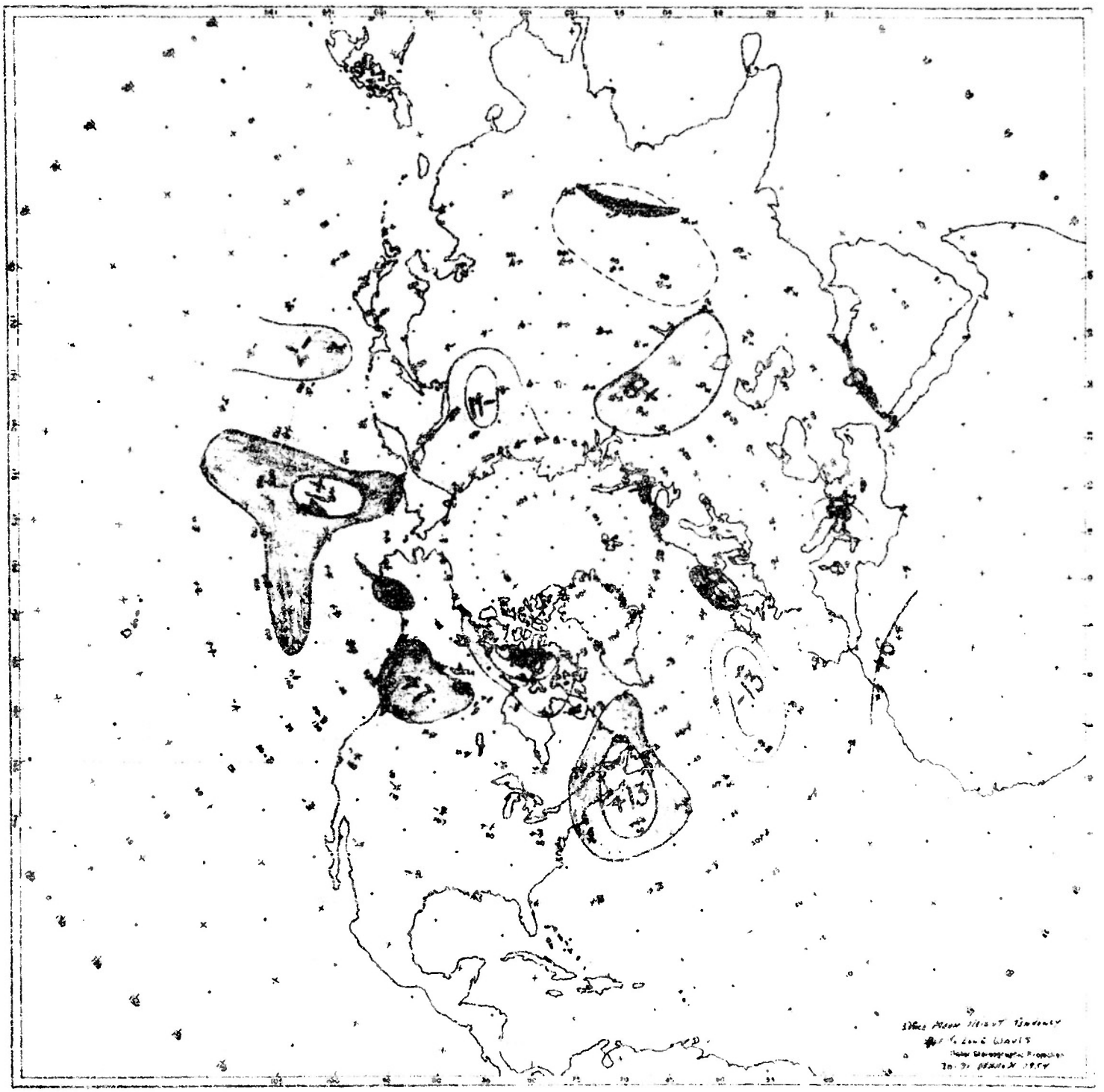

Pole Stereographic Projection
29-30 March 1954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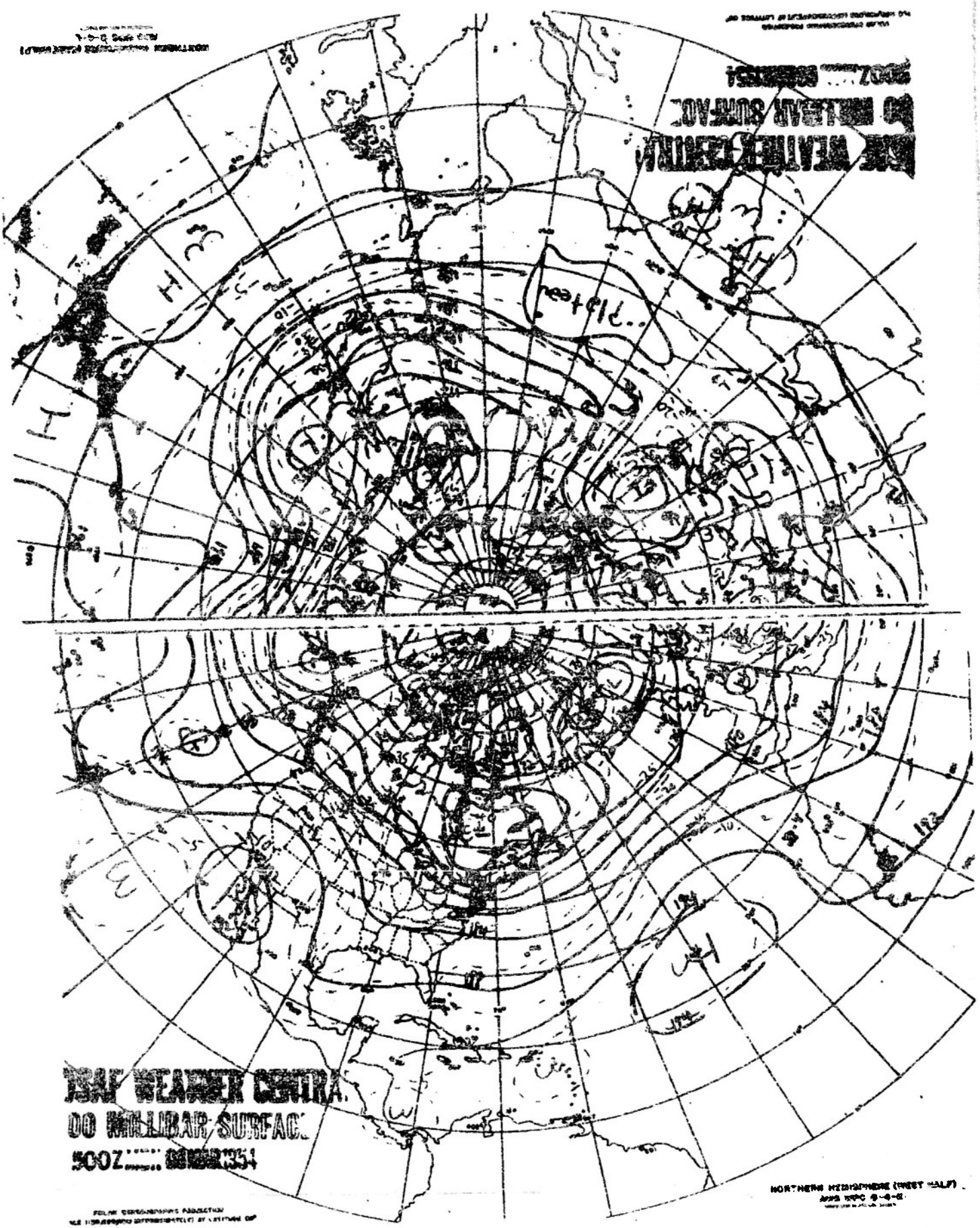
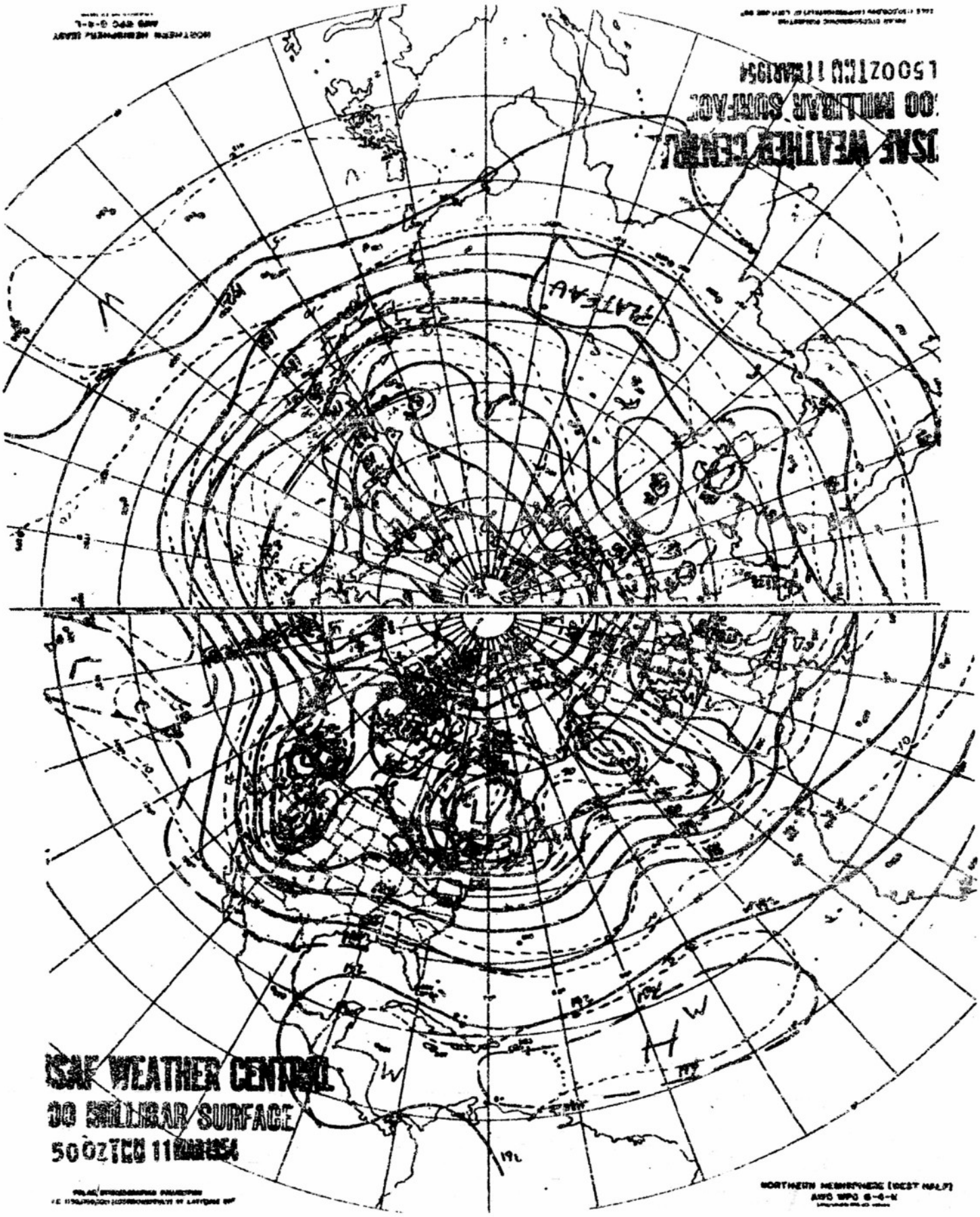
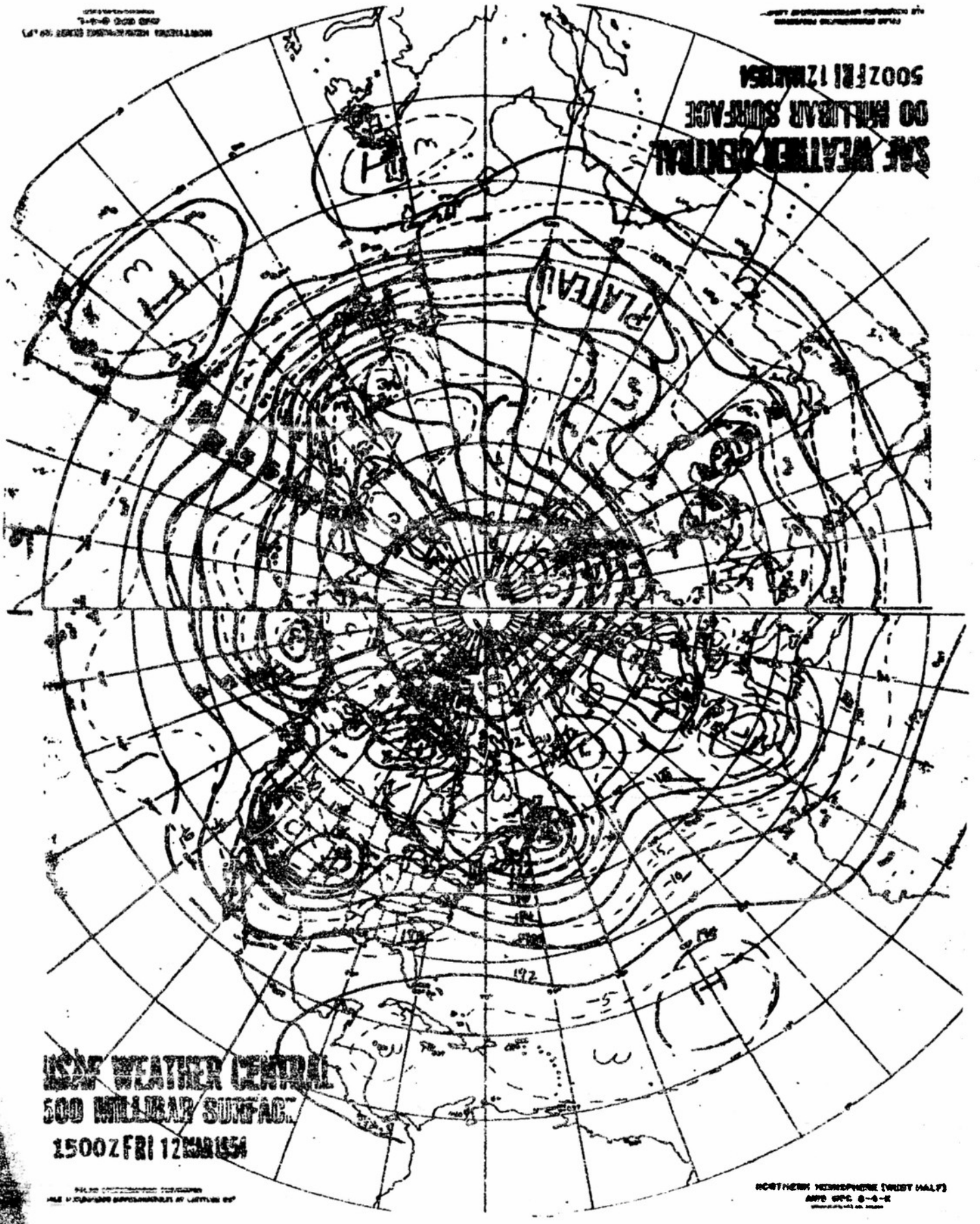
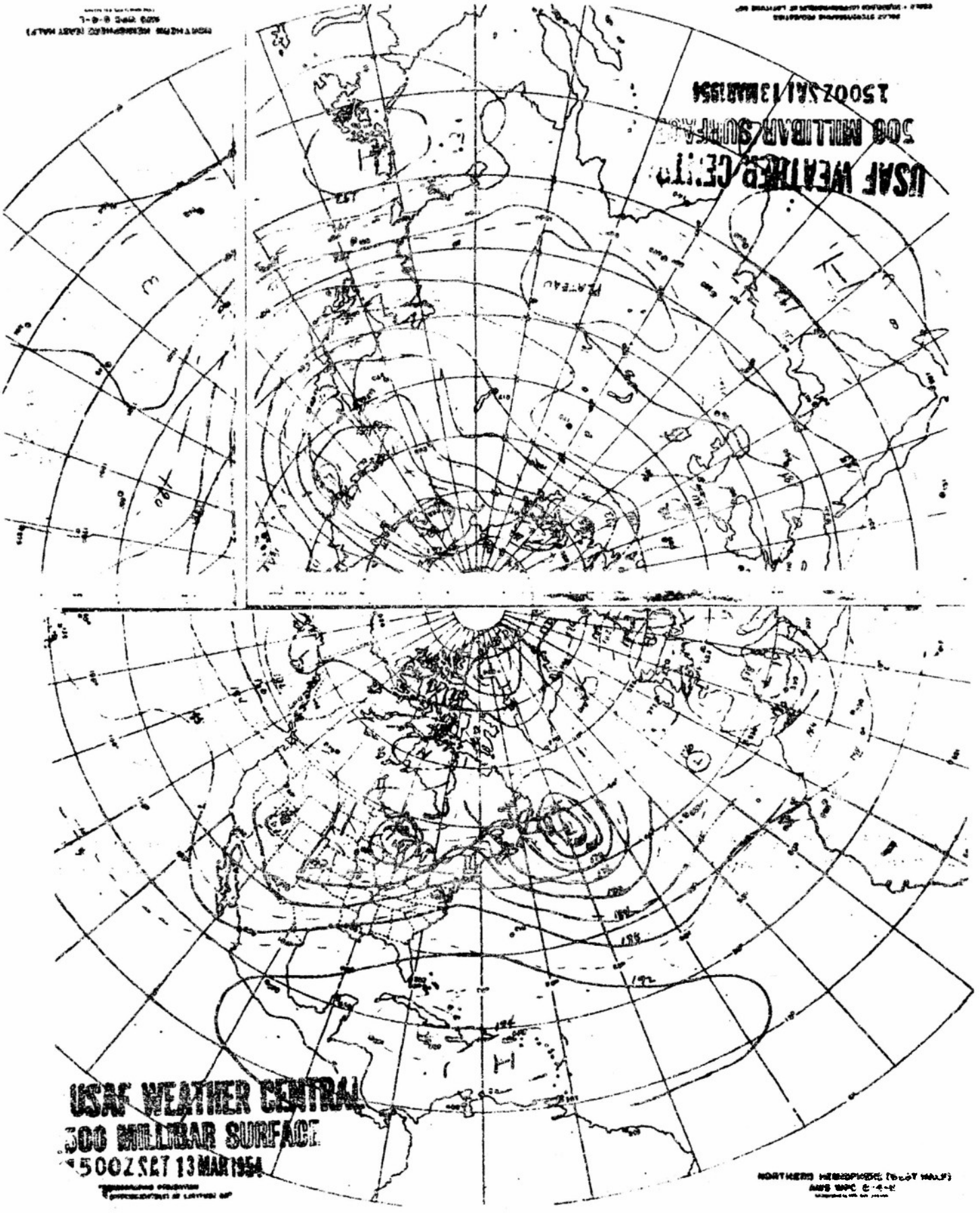
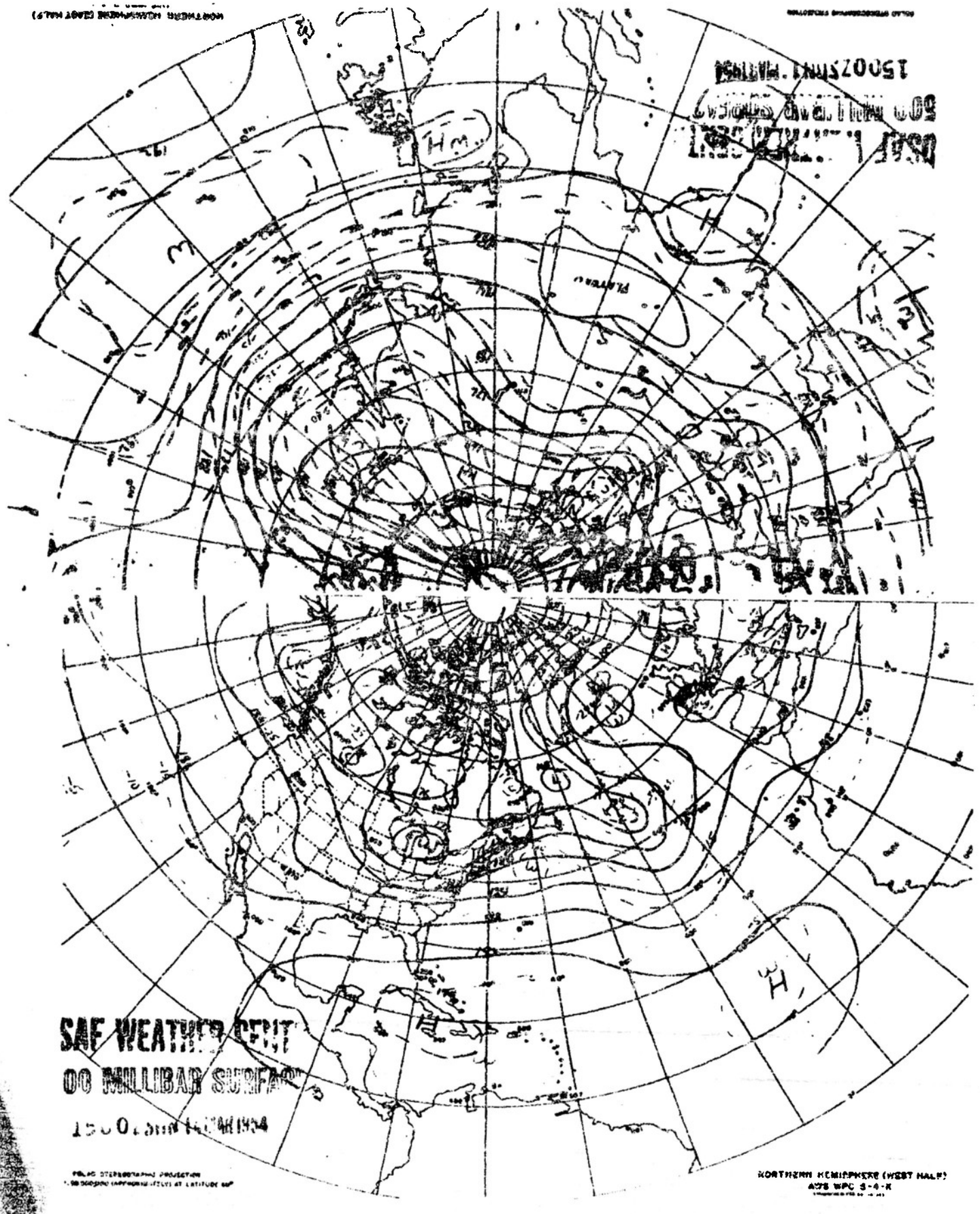

NORTHERN HEMISPHERE (WEST HALF)


ISAF WEATHER CENTRAL
00 MILLIBAR SURFACE
50 OZTCU 11 MAR 1954
NORTHERN HEMISPHERE (WEST HALF)
AWS WPC 6-4-K


USAF WEATHER CENTRAL
500 MILLIBAR SURFACE
1500Z FRI 12


USAF WEATHER CENTRAL
300 MILLIBAR SURFACE
1500Z SAT 13 MAR 1954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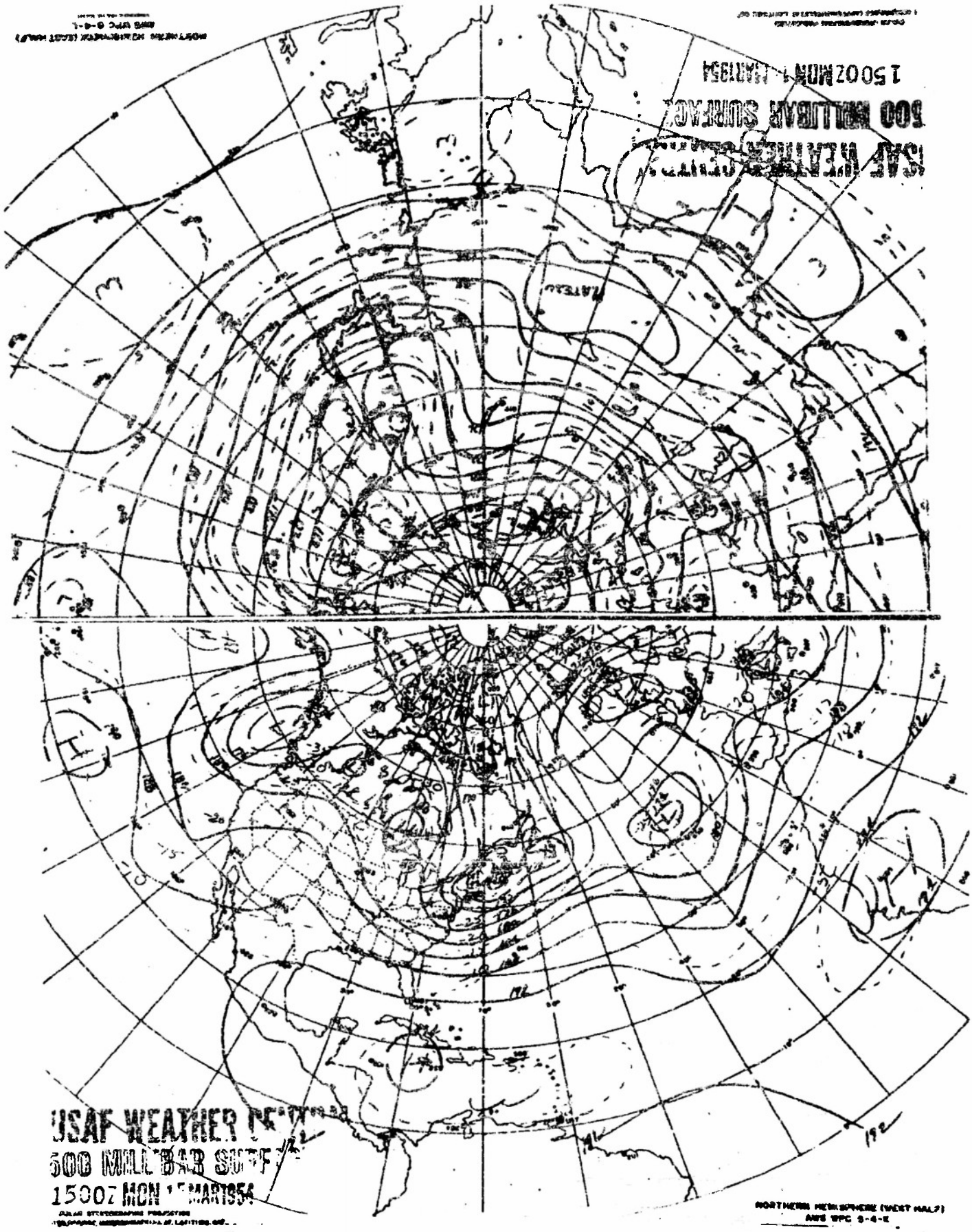
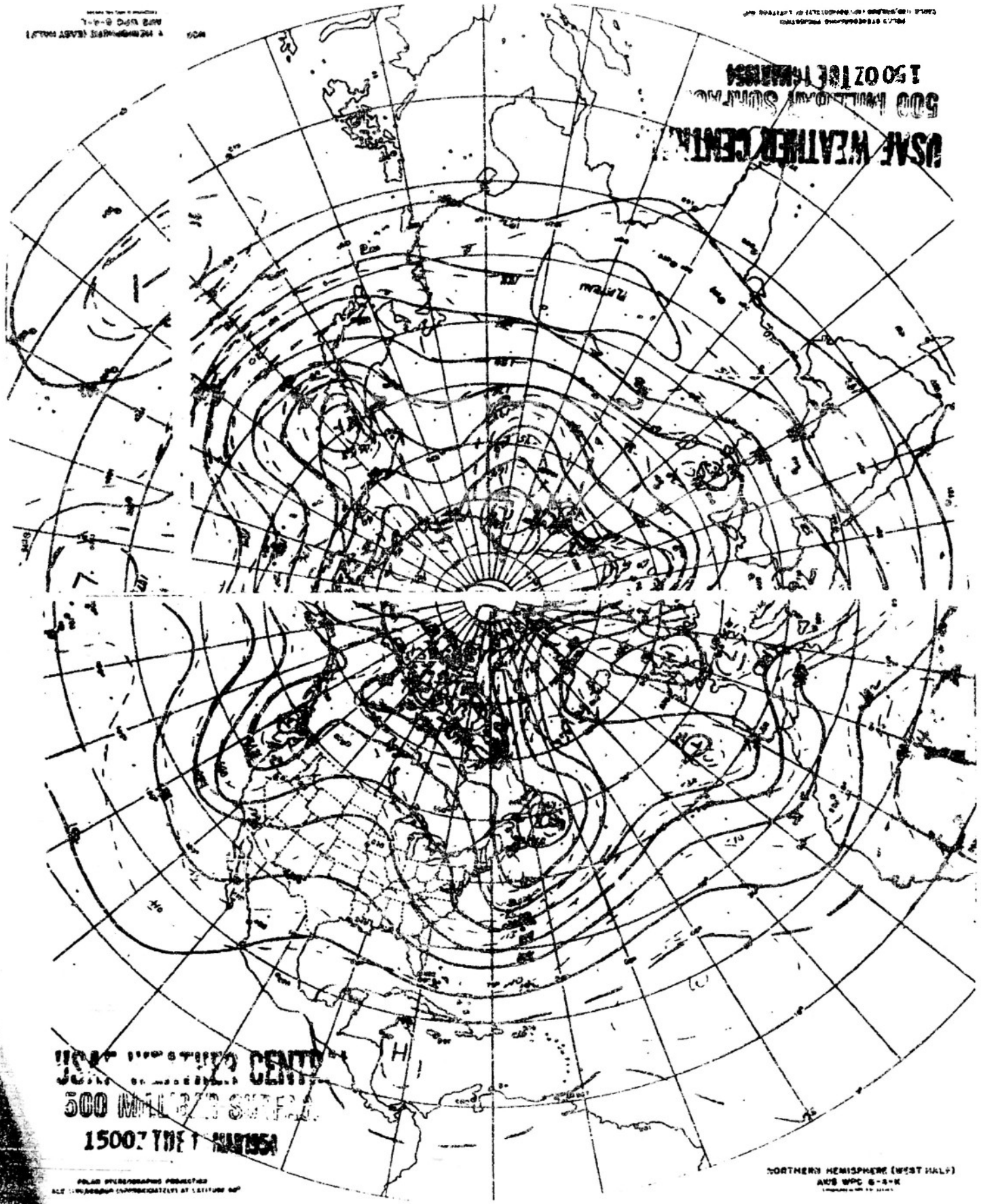
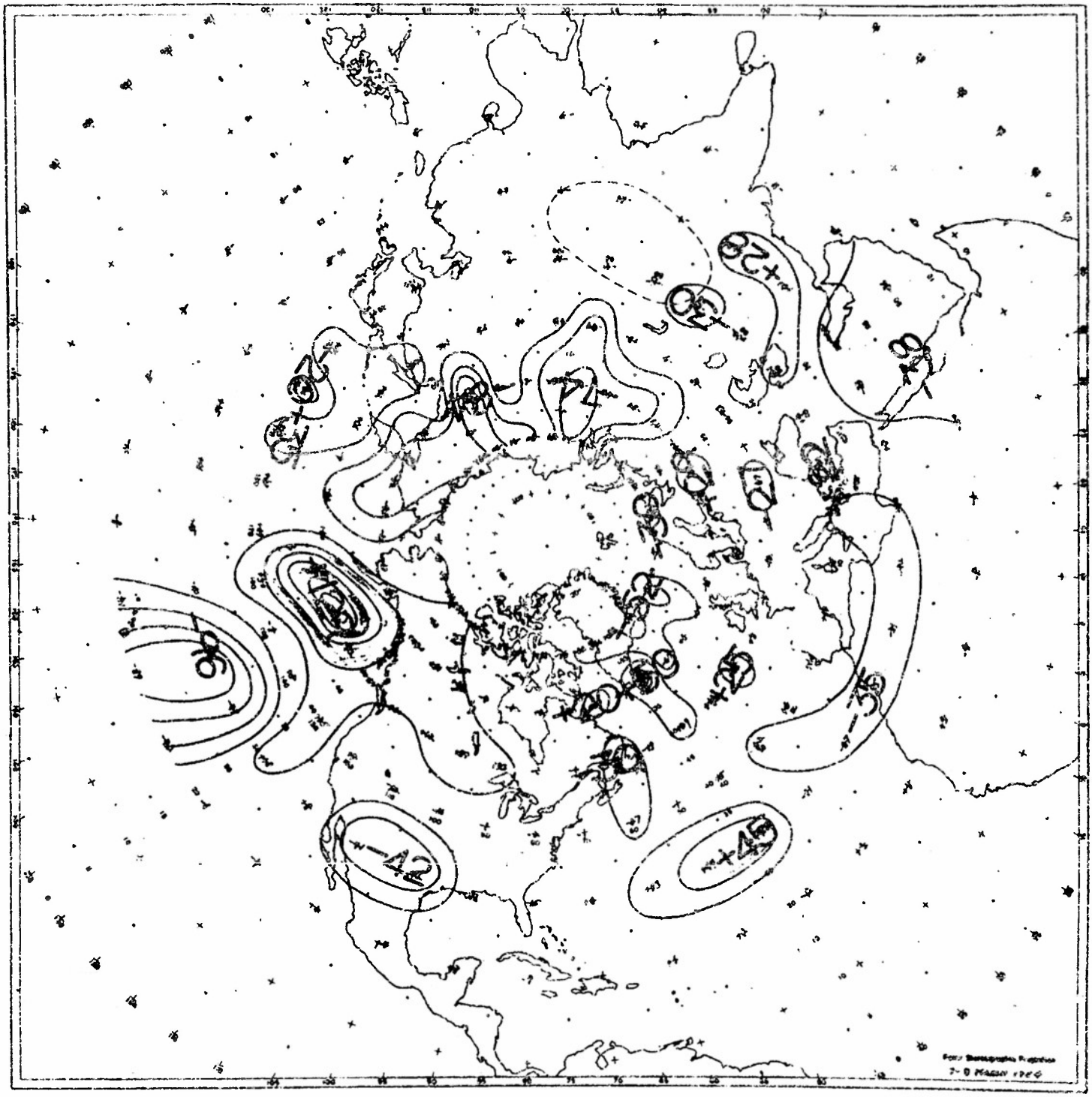

USAF WEATHER
500 MILLIBAR SURF
15002 MON
NORTHERN HEMISPHERE (WEST HALF)
AWS TPC 9-4-E


500 MILLIBARS SURFACE
15007 FEET
NORTHERN HEMISPHERE (WEST HALF)
AWS WPC 6-4-K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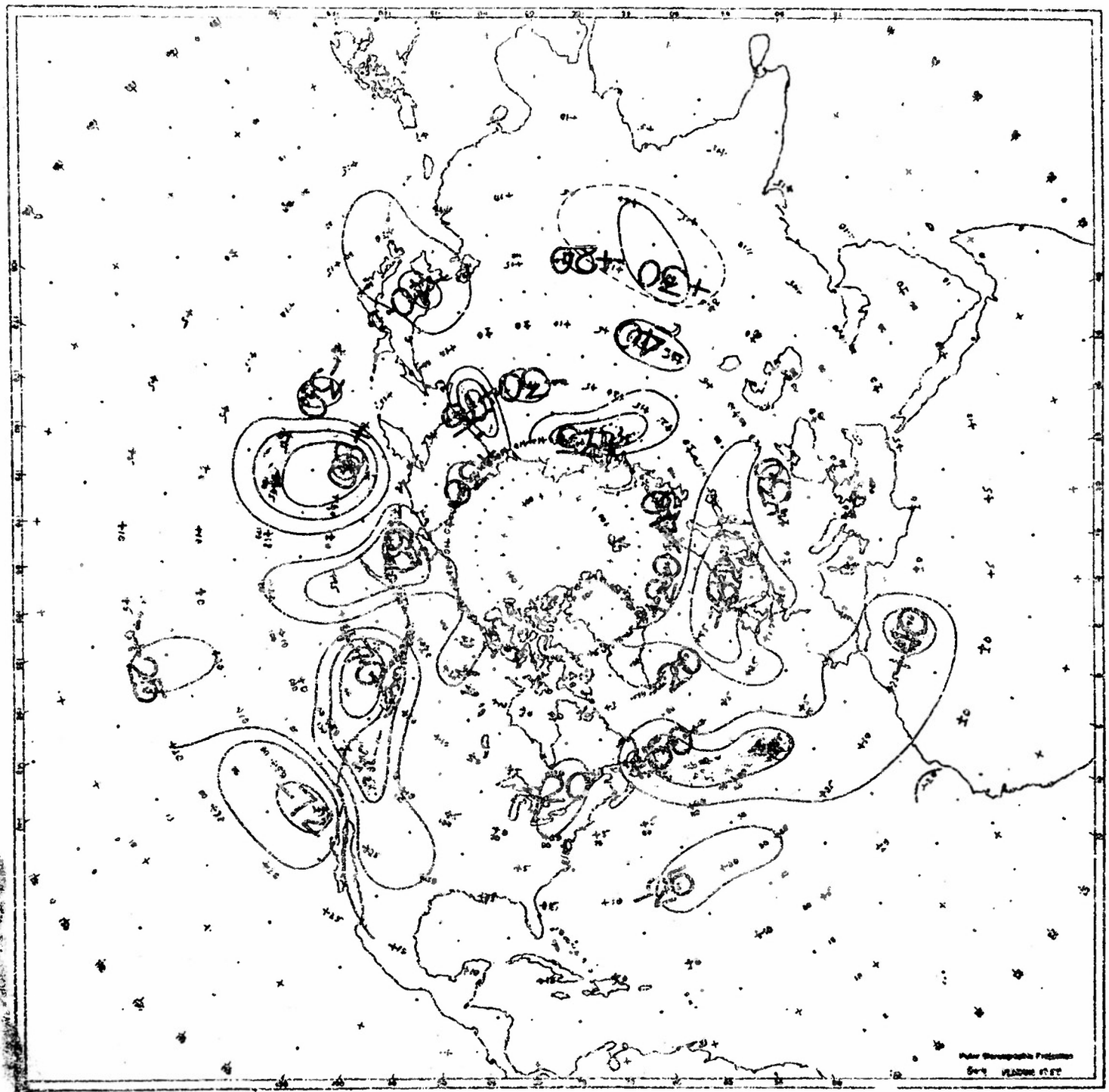

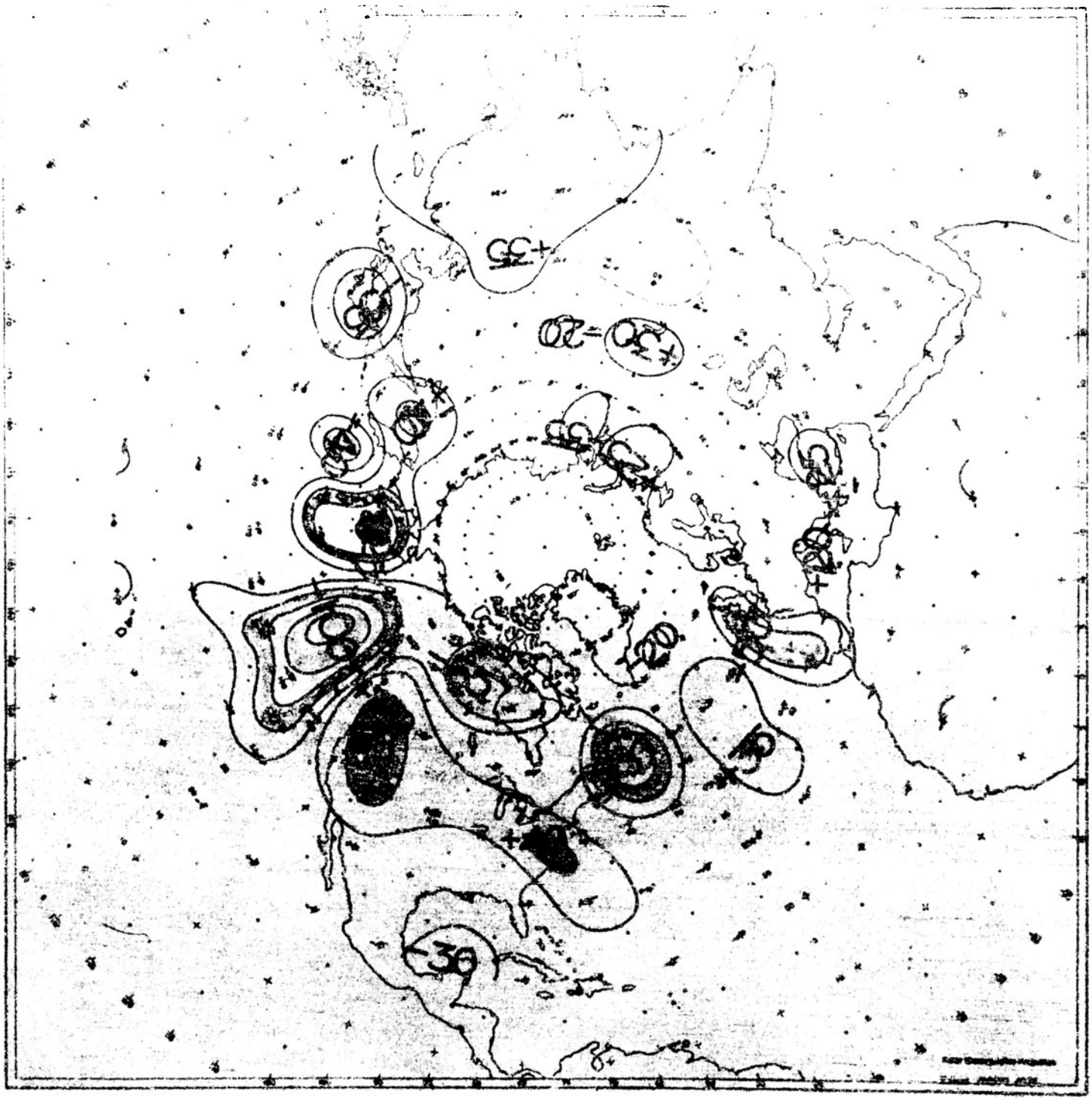
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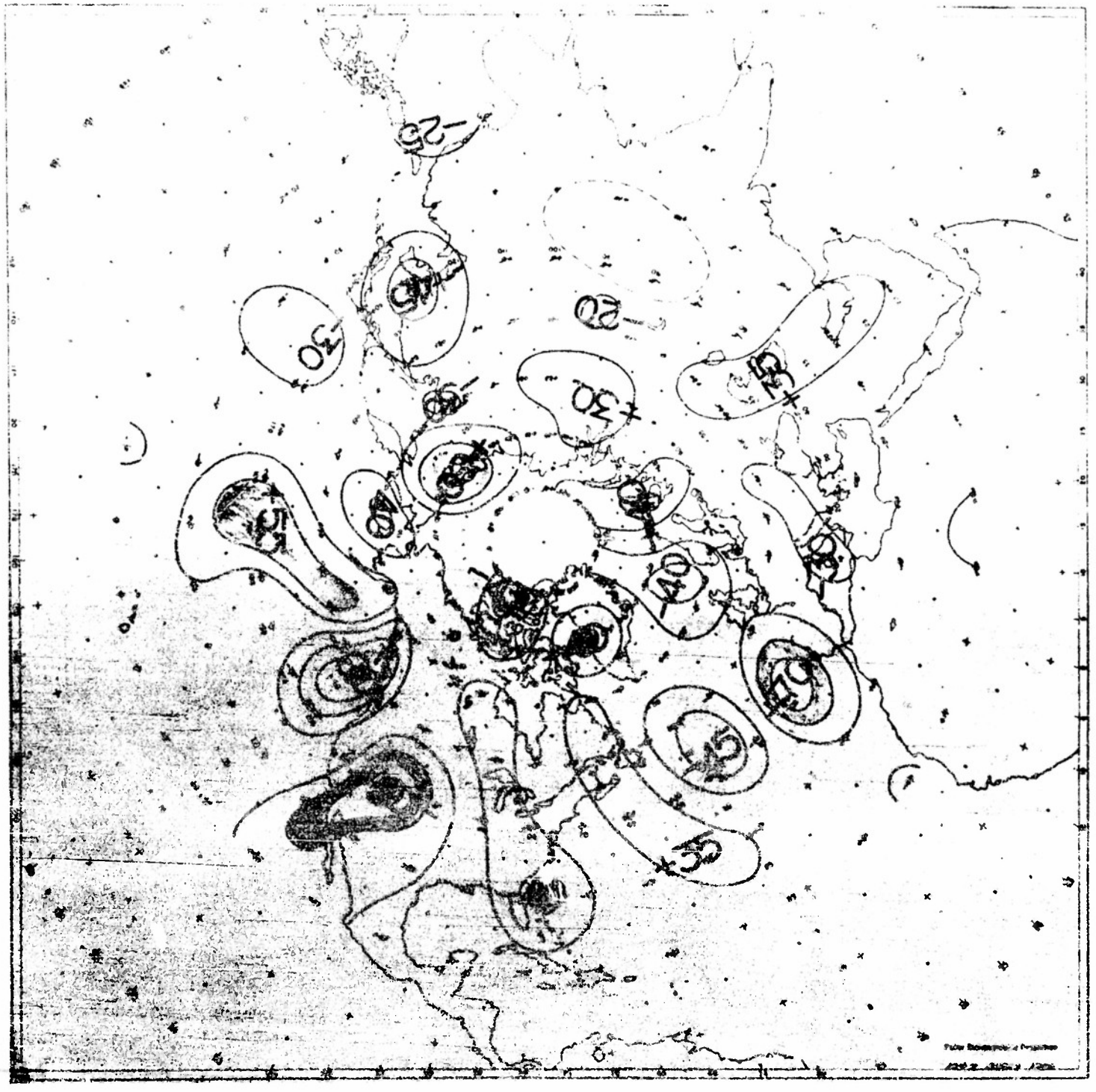

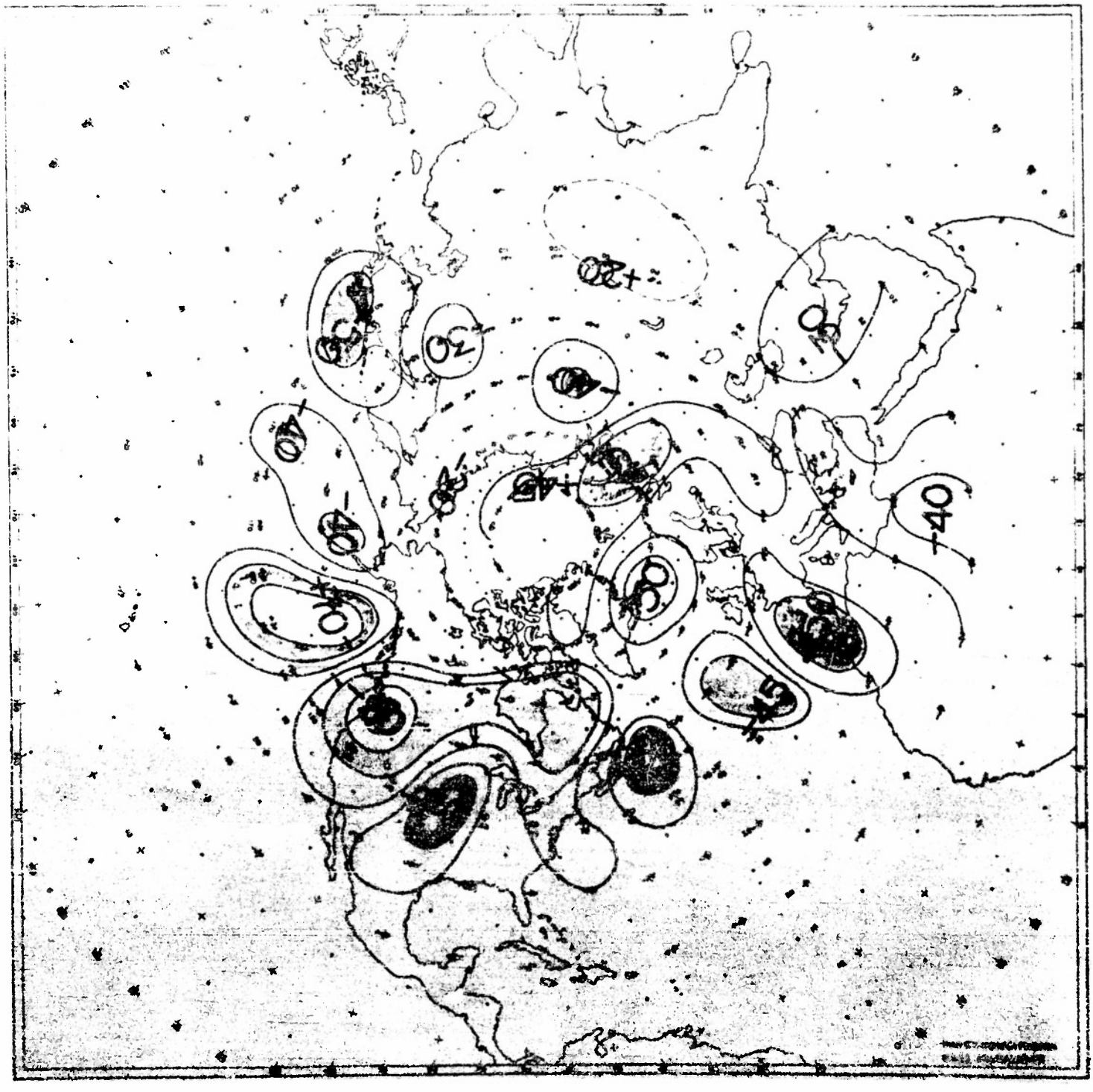
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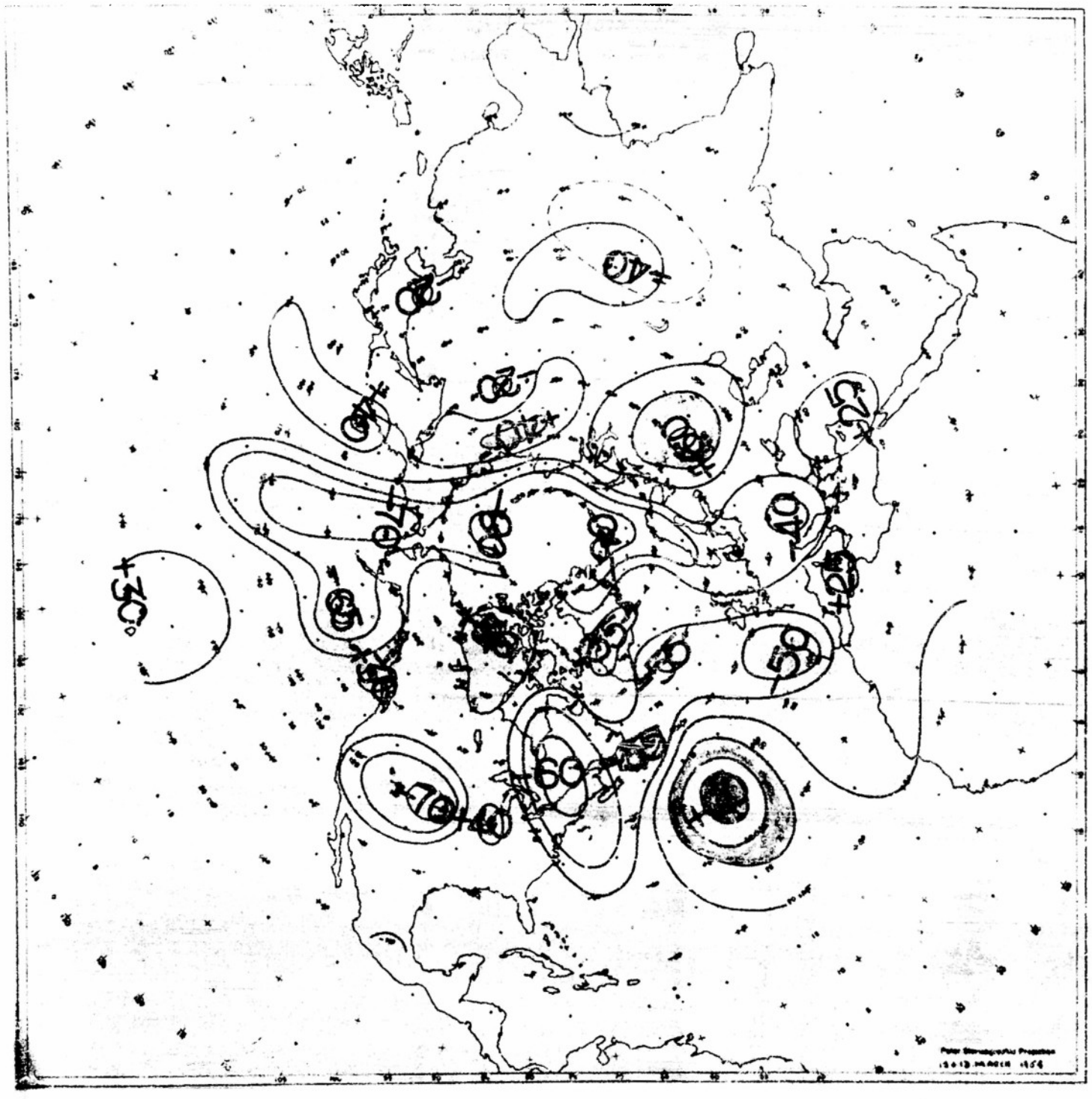

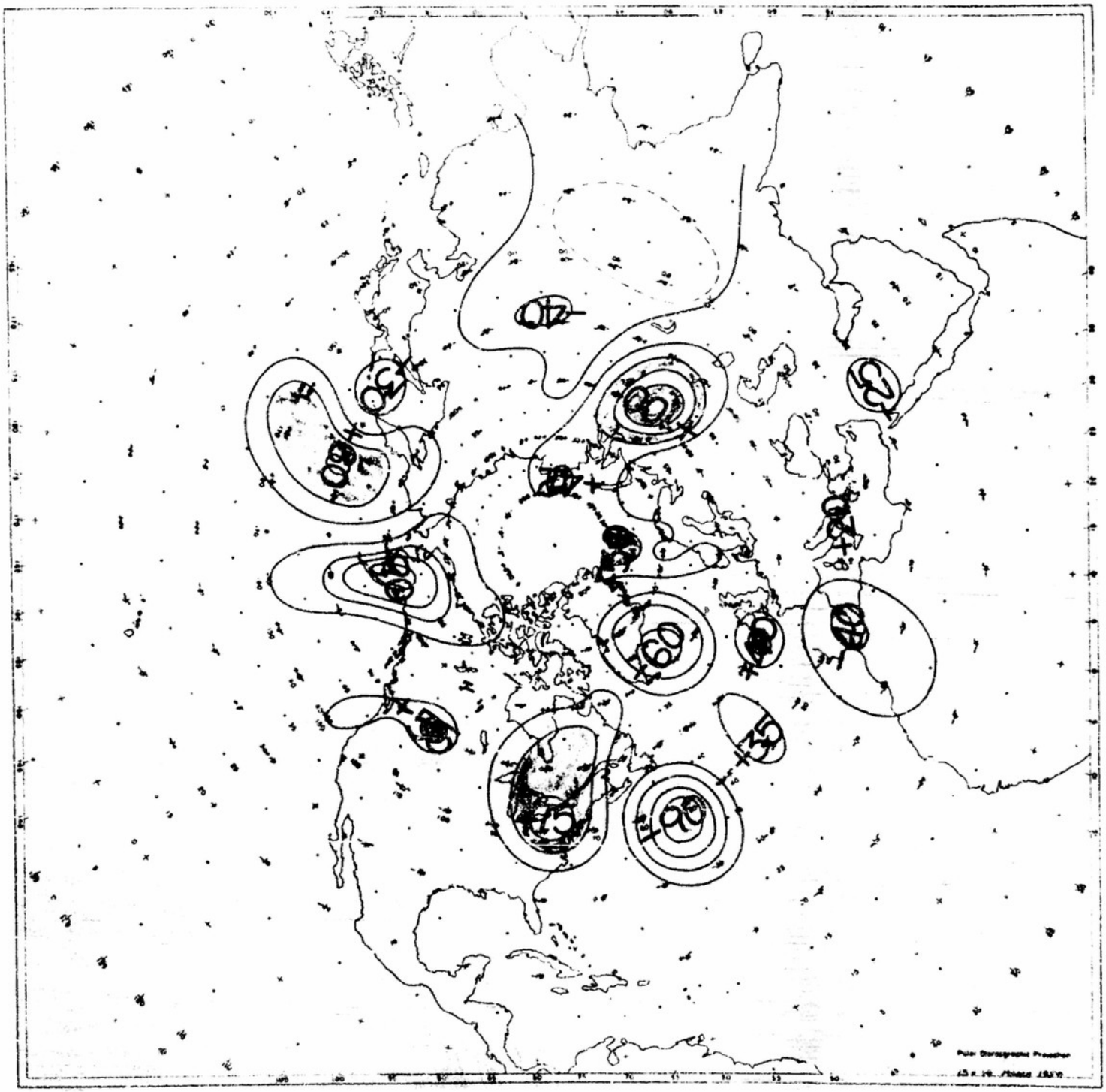

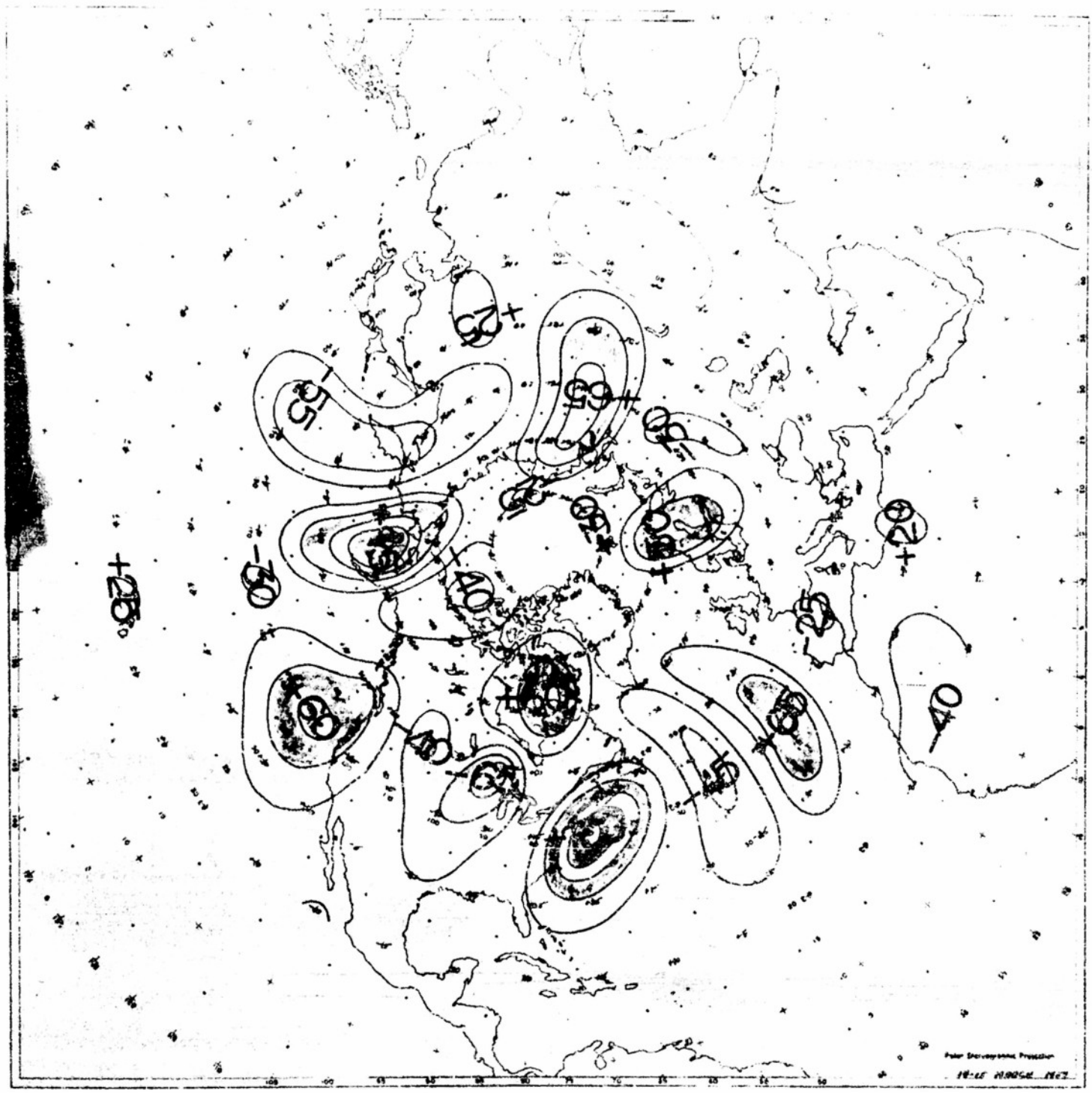
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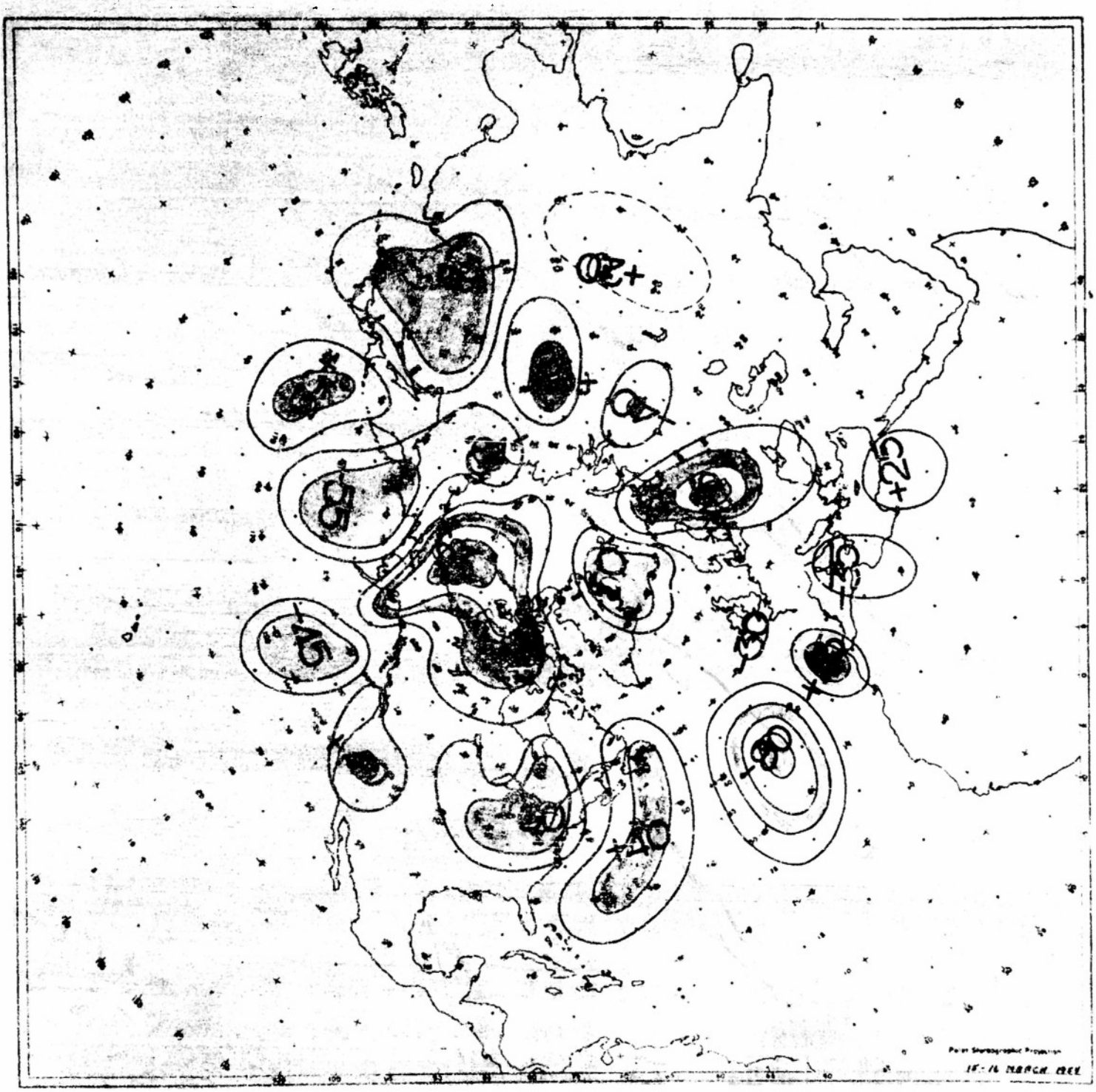
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